THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVII. No. 661.] LONDON, JANUARY 11, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
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GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
(Mixed ready for use).
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
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JOSEPH COWEN and CO.,
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
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RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
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THE
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MANUFACTURERS OF

IMPROVED DRY GAS-METERS,

WARRANTED TO MEASURE CORRECTLY, AND NOT TO VARY.

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G. G. & Co. having had their premises entirely rebuilt, are now fairly in possession of large and commodious workshops, specially adapted to the requirements of the trade, and they are prepared to execute orders, large or small, with promptness and despatch.

THEY KEEP IN STOCK METERS OF ALL SIZES, UP TO 300 LIGHTS.

RANELAGH WORKS, RANELAGH ROAD, PIMLICO,
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G. G. & Co. have just been awarded a SILVER MEDAL for Gas-Meters and Gas Apparatus at the Exhibition of the "Society for the Promotion of Scientific Industry," Manchester.

SILVER MEDAL, PARIS EXHIBITION, 1867.

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LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

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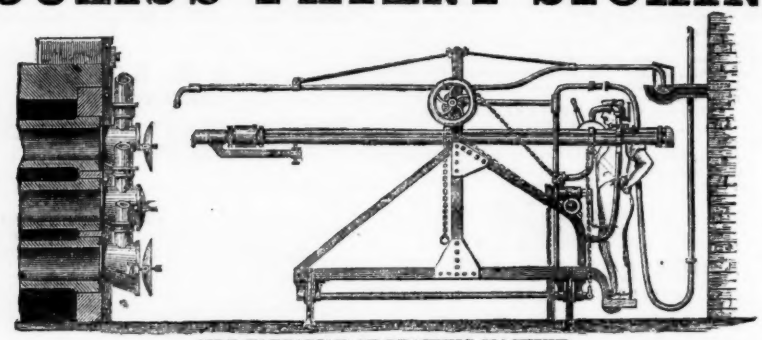
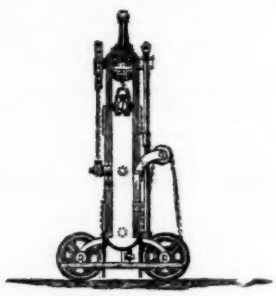


SIDE ELEVATION OF DRAWING MACHINE.



END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

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MANUFACTURERS OF ALL DESCRIPTIONS OF

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

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PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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FALCON STREET, OLDHAM,

MANUFACTURERS OF

GAS-METERS, GOVERNORS, EXPERIMENTAL GASHOLDERS, &c.

HENRY THOMAS, Managing Director.

THE

PATENT "UNIVERSAL" STEAM PUMP

WAS AWARDED, AT THE

VIENNA EXHIBITION, 1873,

THE GRAND PRIZE "MEDAL OF PROGRESS."

AT LILLE—GOLD MEDAL - - - - 1874. AT MANCHESTER—SILVER MEDAL - 1874.

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"The simplest machine of its kind."—*Engineering.*

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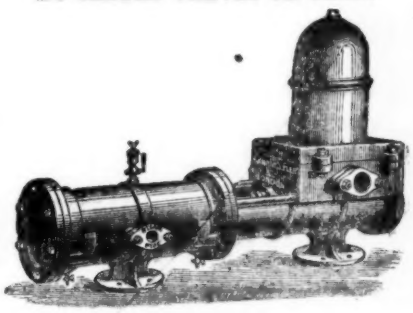
NO TAPPET VALVES OR GEAR.



IN USE IN SOME OF

THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,

FOR

TAR AND AMMONIACAL LIQUORS.

ONE SELECTED FROM AMONGST MANY TESTIMONIALS RECEIVED BY H. T. & CO.:—

"*Ardwick Bridge Chemical Works, Manchester, Oct.* 28, 1872.

"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily,

"Yours truly,

(Signed) "PETER HART, *Manager.*"

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HAYWARD TYLER & CO.,

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MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

TO GAS COMPANIES, ENGINEERS, &c.

These Works are in full operation, and it will be the aim of the New Company not only to keep up the excellent workmanship of their predecessors, but, by the introduction of special machinery, to manufacture **Meters of a higher standard than is usually given, without increasing the cost.**

Special attention is invited to the Compensating Wet Gas-Meter of De Castro and Burton, which is now becoming so generally adopted, and is more simple in construction than any other Compensating or Ordinary Wet Meter. There is but one centre of friction to be overcome by the gas. By its self-adjusting principle it maintains an unvarying water-line; and the reservoir contains sufficient water to supply the Meter for twelve months without attention. It is unaffected by "tilting," and cannot be "flooded" by any pressure.

The Company also manufacture Dry Meters upon the most improved principle, and all their Meters being made to standard gauges, the most accurate measurement is obtained.

Attention is also called to their Dry Meters in Wood Cases, as used by some of the London Gas Companies. These Cases are a great preservation to Tin-plate Meters, especially in seaport towns, where the air is impregnated with salt; they are also particularly suited for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

The F. I. Co. have the exclusive right to make and sell Fraser's Patent "Ribbed" Gas-Retorts in Fire-Clay.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

Apply as above, or to the London Offices, 15, NEW BROAD STREET, E.C.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

WILLIAM SUGG,

GAS ENGINEER,

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WILLIAM SUGG'S LATEST IMPROVEMENTS IN GAS-BURNERS.

The "LONDON" ARGAND BURNER, with SELF-ACTING GOVERNOR (Patent).

"Westminster" Pattern Shade, as used in the Ministers Rooms and Lobbies of the Houses of Parliament.

This Burner is No. D size, and, with a consumption of 5 cubic feet per hour, gives about 2 candles more light than the Gas Referees model, called the No. 1 "London" Argand Burner.

Numerous other pattern Shades, Plain or Ornamental, may be obtained with these Burners.

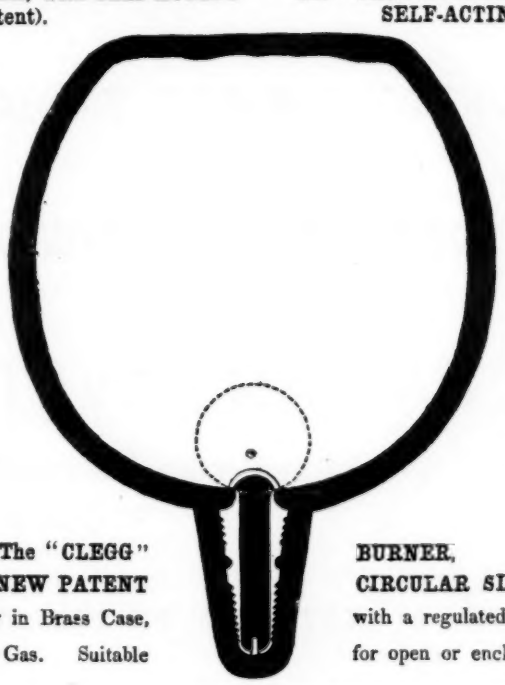
The "CHRISTIANIA" FLAT-FLAME BURNER, with SELF-ACTING GOVERNOR (Patent).

This Burner has been pronounced by the most eminent Engineers of the day to be the perfection of a flat-flame Burner.

The Shades, which are made in a beautiful white glass called Albatrine, are manufactured *exclusively* for these Burners, and cannot be obtained elsewhere.

The light emitted from these Burners is very white and soft to the eyes, and is about 30 PER CENT. superior to the ordinary fishtail.

The Shades may be had either Plain or Ornamental.



The "CLEGG" BURNER, with the NEW PATENT CIRCULAR SLIT.

Is a flat-flame Burner in Brass Case, with a regulated opening for the admission of Gas. Suitable for open or enclosed Lights.

Price Lists and Prospectuses, with description of all the "London" Argand and other Burners, and their proper Shades, Supports, &c., forwarded post free on alication.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,
Has all the appearance of a Bright Fire.
PRICE from 32s.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

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SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

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Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.
„ 1½ to 7 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

B. GIBBONS, JUN.,

DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,

STOURBRIDGE (Established 1834),

MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular . 14 in., 15 in., 16 in., 18 in.
Ovals . . 17 in. × 14 in., 17 in. × 15 in., 20 in. × 15 in., 21 in. × 15 in., &c.
D's . . . { 14 in. × 14 in., 15 in. × 12 in., 15 in. × 13 in., 17 in. × 14 in., 18 in. × 13 in.
{ 18 in. × 15 in., 20 in. × 16 in., 22 in. × 14 in., 24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

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WROUGHT-IRON WELDED TUBES AND FITTINGS,

GUN METAL & OTHER COCKS, ALL KINDS OF IRON & BRASS FITTINGS

For GAS, WATER, and STEAM;

CAST-IRON PIPES, CORE BARS for IRONFOUNDERS,

STOCKS, DIES, and TAPS, GAS PLIERS and TONGS, &c., &c.,

ALWAYS KEPT IN STOCK.

LAP-WELDED IRON BOILER TUBES,

As supplied to the English, French, and Dutch Admiralties, and principal Railways and Engineers at Home and Abroad.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

INVERKEITHING,

Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his

CELEBRATED HALBEATH STEAM COALS,

on Navy List.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

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DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.

These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

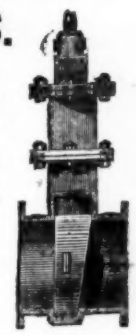
They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.



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MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

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Drawings and Prices upon application.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

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6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
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STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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NOTICE TO SUBSCRIBERS.

Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance for the year 1876, are reminded that this can only be done during January.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 11, 1876.

Circular to Gas Companies.

WHILE we are printing, a meeting is being held at the office of the Board of Trade, which may have important consequences. At the invitation of the President of the Board, a conference takes place to-day, between the Board, the Chartered, Imperial, and Independent Gas Companies, and the two metropolitan authorities, to see whether, or not, some general agreement can be arrived at, with respect to the proposed amalgamation and the Bill of the first named Company, by which the expense of another parliamentary contest may be saved. It is not worth while, now, to encumber our space with suggestions. Before these lines reach our readers view, the conference will be over, and the result we shall be able to make known next week. This, however, we may say, that the officials of the Board of Trade deserve praise for making the attempt to bring about a general agreement. The expense which these repeated contests throw upon ratepayers and gas consumers, is simply enormous. We shudder when we think of the probable cost of the preparation of the Metropolitan Gas Bills, and of the twenty days inquiry last year, the full total of which we shall probably never know.

We are at a loss to conceive what can be urged by the two local authorities against the amalgamations, except the hackneyed, and, we might say, exploded argument, that the amalgamations hitherto effected have not reduced the price of gas. Leaving out of consideration the case of the Great Central Company (the directors of which were for the most part members of the Corporation of the City of London), the amalgamation of which with the Chartered Company, it may be admitted, was not exactly beneficial to the interests of the City consumers, it must be remarked that the other amalgamations did not come into full operation until the advent of a very disastrous period. It must, however, be observed that, if the Great Central Company had retained an independent existence, the combined effect of the losses they had sustained, and the coal famine, would have obliged them to raise the price to the maximum conceded by the Act of 1860—viz., 4s. 6d. per 1000 feet. It is probable, then, that the consumers of the City of London are very little out of pocket by the transaction. And, with regard to the more recent amalgamations, it may be fairly urged, that the consumers, within and without the City, are just beginning to experience the advantages of combination. In the absence of fresh disturbing causes, there can be no question that the price of gas will fall lower than it is at present. A permanent addition of, at least, 2s. per ton, has been made to the cost of coal, but the greater part of this advance can be borne by residuals.

We have repeatedly expressed an opinion that, with the revival of trade, the price of coal will again rise; and we make no secret of a desire that such an event should happen. When legislating for the future, probable contingencies must be taken into consideration; and, when the maximum price of gas in the metropolis is considered, the probability that the cost of coal may be greatly increased, and that coke may again become a drug in the market, must not be overlooked. The vice of the sliding scale is, that it may, at no distant future, punish a company, for events over which they can have no control; while, for a year or two, it may reward one or two, for circumstances they cannot help. But we have said sufficient on this point for the present.

It is not likely that we can learn much of the intentions of the Government on the gas question from the proceedings at the Board of Trade to-day. The opinion of the permanent officials, it is commonly said—and, indeed, Mr. Farrer has written sufficient to justify the statement—is strongly in favour of general amalgamation. It is not likely, then, that the Board will oppose the amalgamations now proposed, unless they are prepared with some alternative scheme. We do not know what are the individual views of Sir Charles Adderley on the question, or even whether or not he has any decided opinion on the matter. It may not, however, be of much consequence, for it is rumoured that, in the course of the changes and reconstructions the Government will, probably, undergo before the meeting of Parliament, Sir Charles will remove from the Board of Trade. While waiting, however, to ascertain what are the views of the Cabinet or Government, we may point out that, whatever the expression may be, it must not affect the action of the gas companies. The London cabmen can defy a Government; the London match girls can defeat one; the publicans can rule a Government; it will be strange, indeed, then, if the great trading companies, who all exist by statutory authority, and whose interests are identical, cannot contend successfully with the two authorities, whose existence is a scandal to, and whose doings are a by-word in, this great Metropolis.

We publish to-day a rather lengthy communication from a gentleman of high standing in the gas world, and, apart from that, a considerable metropolitan ratepayer, who is naturally indignant at seeing his money wasted in two directions. He reviews very fairly the course of past legislation, and very properly points out, that all the amalgamations which have hitherto been effected, have been consented to by the Metropolitan authorities, at whose instance, indeed, they were promoted. In his first paragraph, the writer does not allude to the fact, that the two authorities have no common interest on the gas question. Purchase by them is entirely out of the question now, as in 1867. Even if they offered

to guarantee maximum dividends, instead of attempting to swindle shareholders out of 40 per cent. of their incomes, there can be no purchase without a municipality. The undertakings may be transferred, temporarily, to some authority or other, but the Corporation and Board of Works will never possess them.

As regards the amalgamations, it is sufficient to say with the writer, that they were consented to, and approved, after, as we have a right to suppose, due and careful consideration at the hands of the authorities. The members of these bodies, not being gifted with supernatural vision, could not see farther into futurity than other mortals, and it turned out that the provisions which they expected would operate to the disadvantage of the companies, were brought into operation for the benefit of the companies. This was, of course, a grave disappointment, and once more the authorities started on a course of spoliation. They had failed in an attempt to confiscate 40 per cent. of gas proprietors profits, so last year they came out with a proposal which involved only a sacrifice of about £10 per share on the part of the shareholders. This scheme failed, as did also one for setting up competing works, the preparation of which has cost the metropolitan ratepayers a sum of money, "the amount of which will probably never be revealed." The Regulations Bill went into the House of Commons with the iniquitous provision of a sliding scale entirely against the interests of the companies, and was immediately denounced by the Chancellor of the Exchequer as unjust. It was subsequently amended, in the way our readers know; but was, nevertheless, opposed by a majority of the companies, who were only anxious to retain the rights which Parliament had already conferred on them. So the matter stands at present, the Regulations Bill being still suspended over our heads.

We must refer our readers to the communication itself, for the writer's views on the conduct of the authorities in consenting to amalgamations, which they have now discovered, and might have ascertained at the time, must prove detrimental to the interests of consumers in certain districts. The facts were in the published accounts, before the Board and the Corporation, but they, nevertheless and notwithstanding, consented. Our correspondent simply charges the authorities with "incompetence." He might have gone farther; but we forbear.

It will be seen that the writer agrees with us in our view, that a modification of the Act of 1860 would best serve the interests of companies and consumers. On one point, however, our able correspondent is in error. He says that under the Act of 1860, "the accounts of the companies were required to be sub-"mitted to a public auditor appointed by the Government." Now, we have before pointed out that the defect of the Act of 1860 is, that it requires no audit of accounts, but that made by the companies auditors. We blush to think that anything more should be considered necessary; but candour demands we should admit, that if a public auditor had been appointed in 1860, some things which have occurred, and which may yet be brought to light, would have been impossible to accomplish. The Act of 1860 simply enacted that a Secretary of State might prescribe a form of accounts, and that accounts made out in that form should be regularly furnished to Government. This is done; but no audit is made by a public officer, except in the cases of the companies under more recent legislation.

As we have said before, an amendment of the Act of 1860, which would require a public auditor to examine the accounts, and would provide some more simple machinery for enforcing the rights of consumers than is indicated in the forty-fifth section of that Act, would afford ample protection to the public, and, at the same time, guard the just rights of the companies.

We may pass over much that remains of the communication, and remark on the last paragraph, in which the writer inquires what justification there can be for asking Parliament, in 1876, to alter the provisions of the Acts passed in 1868–9. In our opinion, there is none at all, but this: The Metropolitan Board of Works are conscious of a waning influence. They daily become more and more unpopular. There is an outcry against their exactions, all over the metropolis. It is necessary that they should do something, by which, in appearance, rates should be reduced, and they fasten upon the gas companies, with the view of deluding the ratepayer into the belief that they are doing their utmost to lessen his burdens. How many thousands of pounds of the unfortunate ratepayers money they have already expended on this hopeful business, and when the expenditure will end, we do not know; and, as regards the past, we shall probably never be informed. The Corporation of London, who have next to no interest in the matter, and who are only made a stalking-horse, are, we rather think, getting heartily sick of the business, and would gladly, if they could, find an opportunity for retiring. We must wait a little, however, to see what will turn up, and happily we shall not have to wait long. Much of the future depends on the result of the conference held to-day, and, until we know this, we shall forbear further comment.

We are afraid that it must be accepted as a fact, that delusions never die out, or are completely exploded. Without going back to prehistoric times, in search of the origin of still current fallacies, we may take, as an illustration, the belief in the production of illuminating gas from sewage—a faith but recently promulgated. Our columns have contained several notices of inventions, designed to convert animal excrement into illuminating gas. To-day we have to notice a process by which, it is contended, water-carried excreta may be transformed into light-giving gas. We base our remarks on the reports of an experiment, which have appeared in the daily press, and may say that we rely most on the intelligent statement which appeared in the *Standard*. The following seems to be the process. From tanks placed above them, fall drip, drip, drip, into iron tubes, maintained at a red heat, small streams of "sewage" and of some sort of oil, in the proportion of one pint of the latter, to one gallon of the former. Readers of our JOURNAL need not be told what will happen under such circumstances. The greater part of the water will be converted into steam. Some will, no doubt, be decomposed, yielding hydrogen and forming oxide of iron, which latter will soon put an end to the existence of the tubes. The oil, supposing it is a petroleum residue, as we surmise, will, for the most part, be vaporized; but some may be decomposed, and soon cause the pipes to be choked with soot. That some permanent gas will be formed, we do not dispute, nor do we question the fact that "ammoniacal liquor" will be produced; but in what quantity, those who know the amount of nitrogen in average sewage can easily calculate. We may very briefly summarize, for the amusement of our readers, the reported results of the experiment. A gallon of sewage, costing nothing, and a pint of oil, costing three halfpence, were, by the aid of fuel, which cost one penny, converted into five hundred feet of "pure gas" of twenty-two candle power. The cost of labour is, of course, "merely fractional," and thus the conclusion is arrived at, that twenty-two candle gas can be produced for a little more than 5d. per 1000 feet. Let the sore-distressed metropolitan ratepayer take heart. "Close by "the Beckton Gas-Works," says an enthusiast, "rush daily, millions "of gallons of sewage, and *if*——" But we need not proceed. We do not think that the sore-distressed metropolitan ratepayer will keep his rates in his pocket next year; and we believe that the process, we have briefly described, will undergo many modifications before even a "limited" company can be found to carry it into effect. The inventor may find his prototype in "Gulliver's "Travels." If it be asked, who is the inventor, the answer must be a—Bray.

We do not, in the smallest degree, object to acknowledge that the letter of Mr. G. Livesey, which we reproduced last week, was addressed to, and originally appeared in the columns of, the *Metropolitan*. In reply to our remark that, under the existing law, all surplus profits belong to the consumer, the able editor of that journal observes, in effect, that such is theoretically the case; but the fact is, that the consumers profits are squandered in creating unproductive works, and subsidizing parties connected with the companies. Such allegations have often been made, but have never been proved. Every sensible gas company constructs works which must remain, for a longer or shorter time, comparatively unproductive. As to subsidies to parties connected with companies, we know nothing of them. Gas companies reward their officers (not always too liberally), and recognize, in a legal manner, the value of lengthened terms of service. To call salaries and pensions subsidies, is to misapply the Queen's English. There may, perhaps, be those in Spring Gardens who can tell us something about subsidies to parties not connected with gas companies, but we altogether repudiate the charge as it is made in the paragraph we notice.

The Town Council of St. Helen's and the local gas company have come to an agreement, under which the undertaking is to be transferred to the Town Council, the consideration being the payment of £131,000. As the paid-up capital is, as near as we can make out, about £50,000, it follows that the shareholders will receive something like £230 for every £100 invested. Looking at the prospects of the concern, the Town Council may be said to have made a very fair bargain.

The example of Mr. Woodall, of Leeds, has been followed by Mr. M'Crae, of Dundee, who, in answer to the complaints of bad gas, is about to deliver a popular lecture, illustrated by experiments, on different kinds of burners. We hope to hear more of such demonstrations. Whether or not one would be of any use to the Sevenoaks Gas Company, we will not undertake to say. The complaints in that locality are directed against impurities, rather than low illuminating power. Sulphuretted hydrogen, and an excessive amount of ammonia, it is alleged, are regularly supplied; but fourteen-candle gas, which the examiner reports is furnished, is, in our opinion, good enough for Sevenoaks, or any other place.

A curious case is reported from Dublin. The Alliance Com-

pany sued a customer for gas consumed in the course of three months, during which period the defendant alleged the gas was turned off from the house. The inexorable meter, however, had, in the time, registered a consumption of 2000 feet, and for the price of this quantity of gas the company sued. The law of the case was so clear, that a decision in favour of the company was inevitable. Accepting the defendant's statement, it is certain that the loss was due to leaky fittings, for which the company could not be responsible; and whenever Mr. Taafe again resolves to consume no gas for three months, he should take the precaution to send notice to the company, and have the meter disconnected.

Water and Sanitary Notes.

It is with some regret that we notice a little disturbance of the amicable relations established between the York Water Company and the Town Council of the city. To find Mr. Alderman Leman, M.P., the promoter of the Borough Funds Act, which was originally designed to facilitate the confiscation of gas and water companies, on the side of the company, is an important indication. The dispute, however, is a very small one. It only relates to the charge to be made for supplying water to public urinals. The company want 10s. a year each, and Alderman Leman suggests that they shall be paid 2s. 6d. for each, which we hope the company, taking proper precautions, will accept. We only refer to the matter here, to ask, why public urinals should be supplied with water at all. Is there any conceivable reason why the urine should not be collected in concrete tanks in an undiluted state, and be preserved for agricultural purposes? Let us come near home, and observe the enormous waste of valuable matter which goes on in the City of London. The Commissioners of Sewers, who have great facilities for disposing of manurial products, employ a large staff in collecting horse droppings in the streets, and make a profit, we believe, on the transaction. At the same time they allow hundreds of gallons of much more valuable matter to run daily to waste. The tanks we have suggested might be pumped out every night, and we feel confident that the market gardeners around London would gladly take the contents. If no actual money profit were made, the advantage would come to London in the shape of increased garden produce. There is nothing offensive about urine. The odour it evolves, as it decomposes, is merely the same as that which emanates from the smelling-bottle which nearly every lady carries in her pocket. It has, we know, been accused of spreading disease, but no sensible man believes the story. Let us hope, then, that urine in London and York may be preserved for useful purposes, and not rinsed away at the expense of either Corporation or water companies. Speaking to the Rotherham Town Council the other day, Mr. Bailey Denton said that the miners at Merthyr Tydvil sometimes went to market and bought a cabbage, grown on the sewage farm, so large, that they required assistance in carrying it home. If our suggestion be adopted, the market gardeners around London and York will be able to rival the products of the Merthyr farm without producing its nuisance.

As regards Rotherham, we may say that, the Town Council have not yet resolved on adopting Mr. B. Denton's scheme, although it is evidently viewed with favour. It involves the purchase of eighty acres of land, for the treatment of the sewage of Rotherham and Rawmarsh, by intermittent downward filtration, and farming operations. A combined scheme of drainage and sewage utilization for all the towns in the valley of the Don, from Rotherham to Sheffield, has been suggested; but Mr. Denton is not favourable to the plan, anticipating difficulty of disposing of the products of a farm, necessarily situated at a considerable distance from the markets.

Liverpool itself is now once more entirely supplied with water under the constant system. By districting, and the use of Mr. Deacon's meter to detect waste, the daily consumption has been brought down to twenty gallons per head, and for such a supply the Corporation sources are adequate. As regards the future supply, there is still much agitation in Liverpool, and it is impossible to guess what may in the end be determined upon. We believe that the general opinion of the Water Committee is in favour of one or the other of the large schemes laid before them, but we fear that, when the time comes for asking the ratepayers sanction for the promotion of a Bill to carry either out, the committee will find themselves in a hopeless minority. It might be well, then, for them to accept the situation at once, and consent to experimental borings, with a view to ascertain what additions can be made to the supply by sinking more wells. We are glad to see that the Corporation have recognized the eminent services of Mr. Deacon, their engineer, by raising his salary from £1000 to £1200 per annum. It may be remarked, that Mr. Deacon combines, in his own person, the offices of borough and water engineer, which four years ago were divided between two engineers, whose salaries amounted to £2500 a year.

Rochdale offers an example of a closely-packed town, at present but very imperfectly sewered, but with a fairly good water supply, and an excellent system for the quick removal of human excreta. The sanitary result is a condition of things which compares very favourably with that existing in nine other large surrounding towns. With the exception of Blackburn, the total death-rate of Rochdale is the lowest in the list, while the number of deaths, from what are called zymotic, or preventible diseases, is considerably below that in most of the other towns. The result shows how much may be done by a Corporation who work earnestly to improve the sanitary condition of their district, without indulging in expensive schemes, involving large outlays and heavy debts.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LXXVIII.

The Governor.

Having followed the progress of the gas in its production, purification, and storeage, we now come to its distribution.

For this purpose, in all well-conducted establishments, a governor, to control the pressure of the gas, as it issues from the works, to supply the town or district, is considered indispensable. This instrument is remarkable for its simplicity and efficiency. Its functions are automatic, and, once adjusted, it operates unerringly during any period, irrespective of all irregularities of pressure of the various holders supplying, so long as their pressure is greater than that to which the instrument is adjusted.

A form of governor was among the earliest inventions of Samuel Clegg, and was patented by him, in conjunction with his first gas-meter, a wet-lime purifier, and the rotary retort, to which we have referred. The general impression is that the governor then patented was identical with that now universally employed. This, however, is erroneous; but, the first idea being given, the instrument speedily assumed a practical form, as we find it described in Accum's "Treatise," published in 1819, at which early period it was manufactured by Messrs. Clegg and Crosley for the purpose of regulating or obviating the oscillations produced by their first meter; and for this reason the two were always fixed together.

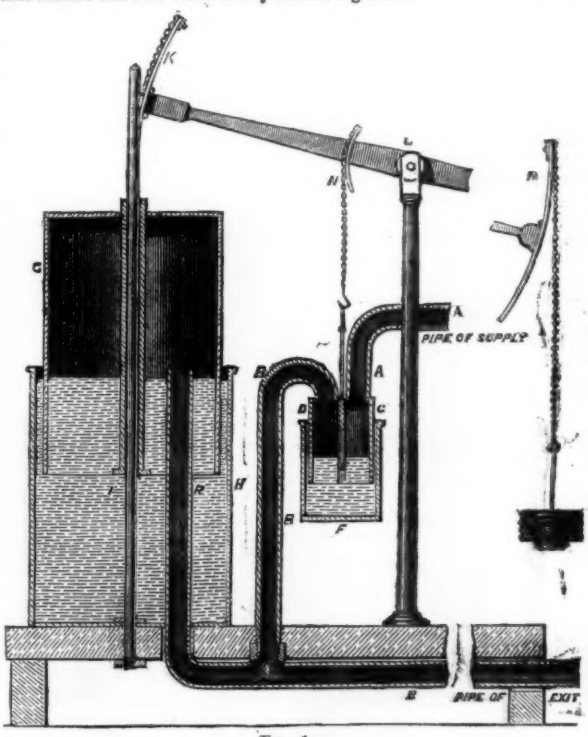


Fig. 1.

The accompanying engraving is copied from Clegg's specification of the patent referred to, and represents a section of his governor, which may be thus described:—

A lever, K L M, is supported by, and works freely in its bearings on, the standard or pillar. At the end K of the lever is a small chain, to which is attached the gasholder guided by a perpendicular rod, I, passing through a pipe in the centre of the holder. At the end M is another chain, to which are suspended weights to counterbalance the holder and the cup, F. Near the centre of the lever is a third chain, guided by its corresponding arch, and to this chain is suspended the cup, F, containing either mercury or water. The inlet-pipe passes into the holder, and a branch therefrom bends over into the cup, from which cup the outlet-pipe, B, proceeds. There is a partition, E, with an orifice at its lower part, through which the gas

passes from the pipe A to pipe B. Hence, if an increase of pressure takes place, the holder will rise, lifting the cup containing the fluid and closing the orifice in the partition, E, by which means the pressure is correspondingly diminished. These were the means adopted by Samuel Clegg, in his first patent, to regulate the pressure. And although we have here the germs of the present governor, the machine, as patented, could not be practically applied, on account of the liquid in the cup having a tendency "to blow" whenever the supply was very limited and the pressure great. In addition to this evil, whenever the opening in the partition became equal in area to the pipe entering the holder, the instrument was no longer operative.

In 1825, Samuel Crosley obtained a patent for improvements in gas-regulators or governor, in the specification of which he describes an apparatus very similar to the governor of the present day, but of this there is no drawing. He therein further describes what we now term a "dry governor," as represented in fig. 2. This is a

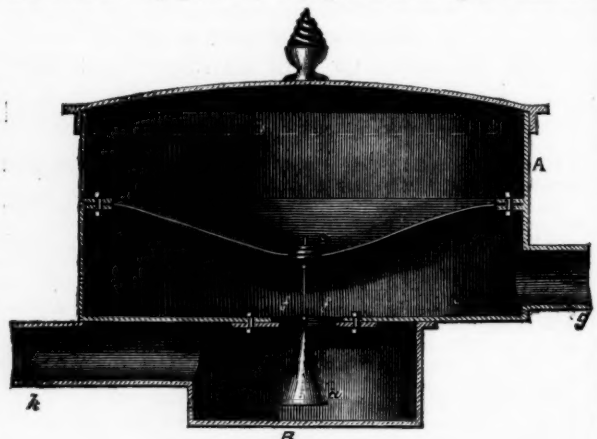


FIG. 2.

vessel of suitable dimensions and form, and is provided with a diaphragm or flexible division made of leather or other air-tight material. From the centre of the diaphragm is suspended a rod, at the lower part of which is a conical plug adjusted to the flange, the two forming a valve. The gas is admitted by the pipe *h* and exits by the pipe *g*. When the pressure increases beyond the desired degree, the diaphragm will be elevated, and will raise the rod and conical plug, and so close or partially close the valve until the proper equilibrium is restored, or the pressure reduced to the required extent.

From the date of the patent of Crosley to the present time, we believe that there is no apparatus connected with gas lighting for which so many patents have been obtained as the governor, or regulator, which terms are synonymous—the former being applied to the instrument when of large dimensions, as in a gas-work; the latter, when fixed on the consumers premises or on street-lamps. Yet, amongst all these, no material change in its construction has been effected. The instrument, as produced originally by its inventor, is identical in principle with that so universally employed for regulating the supply to the public lights at the present time. It is a singular fact, that the value of the instrument adopted for this purpose was only appreciated nearly 40 years after it was invented.

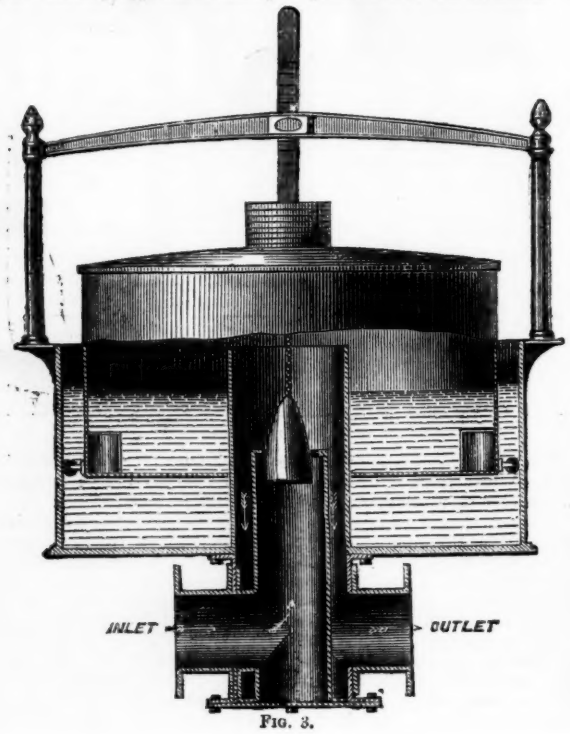


FIG. 3.

The engraving, fig. 3, represents a governor, as usually constructed, the apparatus being partly in elevation, the other portion being in section, for the purpose of showing the various parts.

The outer case, as well as the standards, bridge, and pipes, are of cast iron. The holder is made of tinned sheet iron, guided at the bottom by rollers, working in grooves, and at the upper part by a central vertical flat bar, passing between two rollers, fixed on the bridge, which is supported by the two standards. A scale on the bar indicates the extent of the orifice in the valve. Sometimes the two pipes of ingress and egress are separated, the inlet being in all cases in the centre, but in the drawing they are concentric to each other, which is the plan adopted by some manufacturers, in order to economize space, when constructing governors with small holders, and where rigid economy is not observed, it is the best method of construction. The inner pipe is the inlet, on the top of which is bolted the flange, corresponding with the conical plug. These two are adjusted with precision, so that when the holder is elevated to its greatest height, the gas is completely shut off, and as the holder descends, the orifice for the passage of the gas is gradually enlarged.

At the lower part of the holder is an annular float, shown in section, of sufficient buoyancy to raise the holder with the conical plug and close the valve. In order that it may give the desired pressure, corresponding weights, consisting of discs of metal, are placed on the top of the holder, as represented, and in proportion to the weights and area of the holder, so will be the pressure given. After the description of Crosley's dry governor, the action of this instrument will be readily understood.

The capacity of the area of the holder of a governor, compared with its inlet and outlet pipes, is entirely arbitrary, there being no established rule observed amongst manufacturers of this apparatus; some of them, indeed, making the vessels of two or three times the capacity of those made by others. In our opinion a large holder is always preferable, not only "because we see more value for our money," as a writer facetiously observes, but for its utility. We have known more than one instance where the wrong valve was accidentally closed, shutting off the gas from the town, and the error was remedied before the holder grounded; whereas if the same accident had occurred with a very small holder, probably a portion of the lights in the immediate vicinity of the works only would have been extinguished.

But a more important function of the large gasholder is the prevention of oscillations, which frequently occur when the apparatus is worked to its full extent, in consequence of the heavy pressure acting on the bottom surface of the cone, and the area of the holder not being sufficient to counteract the evil.

In the absence of any definite rule for ascertaining the area of the holder of a governor of limited capacity, we would suggest that this should be twenty times that of the connexions. Thus, a governor, with the inlet and outlet of 15 inches diameter, the area of the pipe would be, 176·715 square inches. And as it is quite impossible to work to such figures, we may assume this to be 180 inches, which multiplied by 20, gives 3600 inches, corresponding with a holder 68 inches in diameter. When the connexions exceed 15 inches diameter, the holder will be required proportionately smaller, diminishing as the pipes increase in size. We are aware that these dimensions are greater than those usually adopted by many manufacturers, yet, on the other hand, they agree with some others, and if a rule could be established upon the point in question, a progressive step would certainly be taken. The height of the holder will be dependent on the length of the cone, the maximum pressure at the works where it is to be fixed, and the depth of the float.

SUPPLEMENTARY CHAPTERS.—RETORT-SETTINGS, No. 1.

We are, this week, enabled to publish the first of the promised series of drawings of retort-settings, and shall continue the series as often as the space at our command will admit. On the sheet now presented to our readers, will be found drawings of a setting of one and of two retorts in an oven. The retort is supposed to be of clay, which, if of good quality, and set in the manner indicated, with first-class bricks in the furnace and its vicinity, will, with moderate care, have a duration of about two years of active service.

Fig. 1 is a front elevation of the setting.

Fig. 2 a longitudinal section of the same.

Fig. 3 is the plan, the arch being removed, so as to show the retort and the passage of the heat.

Fig. 4 is a cross section through the lines A A.

Fig. 5 another cross section through the lines B B, shown in the longitudinal section.

Fig. 6 is a cross section of two retorts set in the same oven.

All the letters of reference apply in the figures to the respective parts; but as the drawing figure 2 is the most comprehensive, we will more particularly refer to that. R is the retort, which abuts against the end wall, for as good clay retorts neither contract nor expand, this may be done without fear of injury to the setting. Should any space be left between the wall and the retort, then, by rough usage, the end of the latter is likely to be forced out. M is the mouthpiece, with its ascension-pipe. F, the furnace, having fire-lumps on its sides, which, having fewer joints, are more durable than bricks, its door being provided with a fire-brick lintel, *e*, to protect it from the heat, and to prevent radiation at this point. P P are piers for supporting the retort; and *c*, a guard slab, to shield it from the direct heat of the furnace; *d d*, are smaller slabs, placed at the two sides, to prevent the heat passing otherwise than through the orifices, O O; N is the main flue, and L the lateral flue, communicating with the oven, and provided with a fire-tile damper, *f*, by which the supply of air to the furnace is regulated. A is the ash-pan filled with water, the steam from which cools the fire-bars, and prevents their speedy

destruction; the steam passing the heated coke is decomposed into its elements, and also becomes a source of fuel.

According to this method of setting, the greater part of the caloric is conducted direct to the retort by radiation, whilst the current or draught carries another portion in the direction of the arrows, through the orifices, O O, over the top of retort, and is absorbed in its passage; the waste heat, which of necessity, must always exist, passing into the lateral flue, L, where it is controlled by the damper, *f*.

The proper attention to the damper is of the utmost importance in the economy of fuel required for carbonizing, for, if it be left too much open, the fuel will pass uselessly away, and, if closed too much, the draught or current will be insufficient, and it will then be impossible for the retort to acquire the requisite heat for the economical production of gas to be effected. The passage, S, represented in figs. 4 and 5, conveys the currrent from the furnace to the orifices, O O.

The *massif* is supposed to be fire-bricks rubble, set with a mixture of ordinary clay and sand, or it may be of common bricks, due care being taken to leave a thickness of from 9 to 12 inches of fire-bricks at this point, for in the course of time the heat penetrates in a remarkable manner.

In fig. 1 are two sight-boxes, their orifices being about 2 inches in diameter. These are indispensable, to enable the manager at any time to observe the temperature of the setting. Should the orifices, O O, become obstructed, they may be cleaned by passing a jointed rod in at the sight-boxes.

All the bricks at the back of the settings and on the top of the arch, which are shaded, are common bricks, or any kind of rubble may be employed, the purpose being to avoid the radiation of heat at these points; all the others are fire-bricks. There is no actual necessity to use fire-bricks for the front of settings above the arch; but, in practice, for appearance sake, it is usually done.

Fig. 6 represents the manner of applying two retorts in a similar setting, the oven being constructed proportionably higher, to make room for the second retort. The lower retort is set precisely as already indicated, the current of heat escaping through the orifices, O O, direct to the upper retort, and so off to the lateral flue.

The same kind of setting may be applied to iron retorts, in which case, the guard slab, *c*, is continued through the whole length of the retort, to the orifices, O O, but a space of 4 or 5 inches must be left between the end of the retort and the wall, to allow of the expansion of the former when heated to the temperature required for gas-making. If this precaution is not observed, the front wall of the arch will probably be forced out. With iron retorts, an incrustation of carburet of iron is continually being formed on the exterior surface, and this being a great non-conductor of heat, it is desirable to remove it from time to time. For that purpose, sight-holes of somewhat larger dimensions than those already described will be necessary, placed one on each side of the retort. In all cases where retorts are required to be constantly in operation, we strongly recommend the use of those made of clay, as being superior on every account to those of iron; but, as before stated, they can only be employed where the pressure is very light, not exceeding 3 inches, including the dip in the hydraulic main. For this object, the holder must be counterbalanced to the actual maximum pressure required for the supply, and all the apparatus, as purifiers, washer, and mains, be of ample capacity.

First-class clay retorts are remarkably friable, and they are frequently broken by the use of the scurfing bar; this implement should, therefore, be employed with the utmost caution, and, indeed, we believe that it can, and should, be entirely dispensed with.

(To be continued.)

A Christmas Appeal.—In answer to our appeal on behalf of the wife and four children of a gas and water works manager in one of the Midland counties who are in a state of great poverty and distress, we have received the following sums:—

Amount acknowledged last week	£18 16 0
West of Scotland Association of Gas Managers (Benevolent Fund)	5 0 0
Mr. H. M'L. Backler	2 2 0
Mr. W. H. Bennett	1 1 0
Mr. G. Anderson	3 3 0
Mr. W. Pitman	0 2 6
Mr. J. K. Watson	1 0 0
Mr. C. Taylor	1 1 0
Mr. G. C. Trewby	2 2 0
Mr. W. Davis	0 5 0
Mr. T. W. R. White	0 5 0
Mr. James Meiklejohn	0 5 0
W. E.	0 5 0
Messrs. G. Waller and Co.	2 2 0
Messrs. Robinson Brothers	2 2 0
Mr. G. D. Malam	1 0 0
Mr. C. W. Grimwood	0 5 0
Mr. W. F. Carpenter	0 5 0
Mr. John Lees Cocker	1 1 0
W. L.	0 5 0
Mr. Robert Morton	3 3 0
Mr. Peter Simpson	0 10 6

Harrogate Sewerage.—On the 4th inst., Mr. Robert Morgan, C.E., Local Government Inspector, held an official inquiry at Harrogate, to consider an application made by the Harrogate Improvement Commissioners for sanction to borrow £8000 for works of sewerage and sewage disposal. This amount was rendered necessary in consequence of the new irrigation farm now being laid out in answer to the order of Vice-Chancellor Bacon, made in the suit of *Wood v. Harrogate Commissioners*.

Communicated Article.

METROPOLIS GAS SUPPLY.

(BY A GAS SHAREHOLDER AND RATEPAYER OF LONDON.)

"Out of their mouths ye shall judge them."

How far are the Corporation of London and the Metropolitan Board of Works fit Stewards of the Interests of the London Ratepayers, as exemplified by their Dealings with the London Gas Companies?

At most of the meetings of the Corporation of London and of the Metropolitan Board of Works, the question is mooted of the advisability of their becoming the purchasers of the undertakings of the metropolitan gas companies. This, moreover, is no new question, but has occupied the attention of those bodies since the year 1860, when the first Metropolitan Gas Act was passed, at which time the price of gas in London was fixed at 4s. 6d. per 1000 feet, subject to a limited increase in the event of a rise in the cost of coal and other materials. Owing to the large increase of consumption which has since taken place, it is now selling at 3s. 9d. per 1000 feet, and in some districts at less; yet the dividends of the companies have been generally maintained at their maximum, notwithstanding this great reduction in price, which may be fairly estimated at not less than half a million per annum for the whole of the metropolis. Now, if the two bodies before referred to could have made up their minds to deal fairly with the companies, they might have possessed themselves long ago of their undertakings, at a price of several millions less than they would now obtain them for, and could have raised all the additional capital which has been spent by the companies since 1860, at about 4 per cent., in lieu of the dividend of 10 per cent. (or 7 per cent. as the case may be), which they are authorized to divide on their expenditure, thus saving an enormous annual sum to the public. But instead of meeting the companies fairly, both the Corporation of London and the Metropolitan Board of Works have invariably endeavoured to obtain possession of their works at prices below their value, and have thus deservedly failed in carrying their wishes into effect.

Thus, in 1867, we find them trying, by every means in their power, to induce the Government of the day to bring in a bill, *compelling* the companies to sell their undertakings to them on a guaranteed dividend of 6 per cent., in lieu of 10 per cent., which they were then authorized to divide; the result of which would have been to reduce, by 40 per cent., the income of the shareholders, many of whom are solely dependent on those incomes.

How it can have been supposed that any Government would have made themselves parties to such a spoliation of the shareholders, it is difficult to conceive; and it is equally difficult to imagine how any body of men, animated by a spirit of fair dealing, could have made such a proposal. But, at all events, the Government declined to be a party to it, and so the matter dropped.

In the previous session the Corporation of London had endeavoured to pass a bill, enabling them, at the risk of the ratepayers, to establish works in competition with the companies supplying the City, in which act of injustice they also signally failed; but in 1868 they succeeded, under the auspices of the present Lord Cardwell, in passing an Act for regulating the supply of gas in the City, which they paraded for a long time as a great boon to the consumers, and a great victory over the gas companies. The Metropolitan Board of Works adopted the same views, and in 1869 they succeeded in enforcing the principal provisions of this Act on the Imperial Gas Company, representing it as a *model Act* for regulating the future supply of gas to the metropolis.

The principal provisions of this Act were to secure the supply of 16-candle gas to the public, at an initial price of 3s. 9d. per 1000 feet, which at that time was considered sufficient to secure a 10 per cent. dividend, and which price was never to be exceeded, unless, from unforeseen circumstances, the materials used in its manufacture should so increase in value as to make it impossible for the companies, with due care and management, to secure that dividend. They were not, however, to be judges, in their own cause, of what was due care, or of what should be the price of gas in excess of 3s. 9d. per 1000 feet, which questions were to be referred to indifferent arbitrators, before whom both parties were to be heard, and who were bound to allow of such an increase *only* as would admit of the statutory dividend, and no more, being attained. On these conditions, some millions of money have been since subscribed by the public.

The Act in question also contained provisions for facilitating amalgamations amongst the metropolitan gas companies, on the importance of which, in the interests of the consumers, great stress was laid by the Corporation and Board of Works; and, consequently, the Board of Trade were allowed, without the future intervention of Parliament, to sanction such amalgamations, but only after *due notice* to those two bodies of the terms on which they were to be entered into, against which (if disapproved of) both of them were entitled to be heard before the scheme could be sanctioned.

In accordance with these last-named provisions, amalgamations have since taken place between the Chartered Company and the City of London, the Great Central Consumers, the Equitable, the Victoria Docks, and the Western Gas Companies, upon schemes approved by the Board of Trade (and, as the consumers have a right to suppose), after due and careful examination of those schemes by their representatives in the Corporation of London and the Board of Works. How far this expectation, on the part of the ratepayers, has been realized, will appear hereafter.

In the last session of Parliament these two bodies, dissatisfied with their past legislation, and acting upon their former principles of desire to possess the undertakings of the London gas companies at a price below their value, introduced two bills, one of which had for

its object the outlay of more than ten millions of money, at the risk of the metropolitan ratepayers, in the erection of new works, and the breaking up of all the streets in the metropolis, in order to compete with the existing companies; and the second, to enable them to purchase their undertakings, at the *average market price* of their shares during the preceding three years.

It was, of course, obvious that it could never have been the intention to pass *both* bills; and, inasmuch as Parliament had more than once reported upon the expediency of London being supplied with gas under a well-regulated *monopoly*, there could hardly have been much expectation of passing the first-named bill, though its introduction into Parliament must have subjected the Board of Works (*alias* the ratepayers) to a very heavy outlay, the amount of which will probably never be revealed. The only possible assumption as to the reason of introducing the first-named bill (however derogatory this may be to the Board of Works) is, that it was promoted in the hope of reducing the value of the property of the companies; but it wholly failed in this respect, as their shares gradually rose in value in the market. The fate of this bill was, as might have been rightly surmised, that it was no sooner introduced into Parliament, and met the light of day, than it had to be withdrawn.

The same fate attended the other bill for the purchase of the company's undertakings, the effect of which would have been, to compel every purchaser of a share at its maximum value in the market during the last three years, to sell it to the Corporation of London and the Metropolitan Board of Works at the medium between that price and its lowest price, which would have involved a sacrifice on his part of, certainly, not less than £10 per share. Here, again, it is really difficult to understand what can be the principles of fair dealing, by which the two bodies are actuated, or how they could suppose, that the House of Commons or Lords would ever lend themselves to such a spoliation of shareholders, who had honestly invested their money on the faith of Acts of Parliament, by which the value of their investment was supposed to be secured. However this may be, the bill, as before stated, was no sooner presented to Parliament than it had also to be withdrawn, at how much sacrifice of the ratepayers money is not known.

A third bill, however, was promoted by the two bodies jointly, which had for its object, the repeal of the principal provisions of the Acts of 1868 and 1869, passed at their own instance; and in the passing of which they had boasted that the public would be so much benefited, and the substitution of provisions, compelling the companies to forfeit a portion of their authorized dividends, if they should ever exceed 3s. 9d. per 1000 feet in the price of their gas, no matter how much the cost of materials should have risen in value, so as to make it impossible to maintain those dividends. This bill having been submitted to Government, the Chancellor of the Exchequer at once expressed his opinion, that it involved so obvious a violation of justice to the shareholders in the gas companies, who had invested their money under totally different conditions, that it would be opposed by the Government, whereupon the promoters, defeated in their unjust object, were fain to accept a suggestion of the Board of Trade, to the effect that in the event of the companies reducing the price of their gas below 3s. 9d. per 1000 feet, they should be allowed to increase their dividends to the same extent, and in the same proportion, as they would be compelled to reduce them in the event of their exceeding that price.

Before the Committee, to whom this bill was referred, the Board of Works and the Corporation of London did not hesitate to declare, that it was simply owing to the provisions of the Act of 1868 having been favourable to the companies, by enabling them to increase the price of their gas, owing to the unprecedented rise in the price of coal, that they objected to the continuance of that Act, and sought its repeal. They did not for a moment contend that the Act had not fulfilled its declared intentions, to which they were themselves parties, and on the faith of which large sums of money had been subscribed, but they sought its repeal simply because it had operated to the benefit of the gas companies, by enabling them to maintain their authorized dividends. Had it operated to the benefit of the consumers, and to the detriment of the latter, they would certainly have been too happy to insist on its continuance.

Most of the gas companies opposed this bill, as being a distinct violation of the provisions under which their capitals had been subscribed; but one of them (viz., the Commercial Company), who had a bill before Parliament, were induced to accept of its provisions, as the consideration of their bill being passed; and the engineer of the South Metropolitan Gas Company also gave evidence in favour of the bill, so that it ultimately received the sanction of the committee.

The Imperial Gas Company had also a bill before the same committee for increasing their capital, and were told that they could only be allowed to pass it on their accepting the sliding scale, proposed in the bill of the Board of Works and Corporation, which they refused to do; but it may be observed, that one of their directors, who was a principal witness against the bill, stated in his evidence, that if he could rely on the honesty of its promoters, and the finality of its provisions, he, individually, would accept of it, under the opinion that, if the cost of materials did not increase, the price of gas would probably to some extent decrease; but he was, nevertheless, strongly opposed to the bill in the interests of the shareholders, not only because of his distrust of its promoters, which was justified by their antecedents, but as substituting a speculative investment for the safe and assured one which the existing law gave them.

The bill was not allowed to pass beyond the report from the committee, owing to want of time, though it is understood that it is to be reintroduced in the ensuing session.

In the meanwhile, the Chartered Company, and the Imperial and Independent Companies, have agreed to amalgamate, and a scheme with this object is now before the Board of Trade, which has been submitted to the Corporation of London and the Board of Works, who (as before stated) were the great promoters, in 1868, of the principle of amalgamations between the companies, and which principle has been also strongly advocated by committees of both Houses of Parliament, to whom the question of metropolitan gas supply has been referred.

It is amusing now to see, from a report of the Metropolitan Board of Works lately published in this JOURNAL, what has been the result, according to their view, of those amalgamations, and the public may fairly judge therefrom of the care and efficiency with which their interests are guarded by their representatives in the Board, who actually take credit in their report for the wisdom of their past proceedings!

Will it be believed, that now, in 1876, these two bodies actually hold out, as a reason against future amalgamations between the London gas companies, which they themselves so strongly advocated in the year 1868 as the best means of securing economy in the supply of gas, and uniformity of legislation in regard to that supply, that the amalgamations which have since taken place (be it remembered under their own sanction), have had the effect of increasing the cost of gas to the public, throughout a large district of the metropolis, from 3s. 6d. to 5s. per 1000 feet.

Nor does it appear, from their report, that this increase could not have been foreseen, for it states that, in the case of the amalgamation with the Central Consumers Company in 1870, that company were then in a condition, *as shown by their accounts*, to sell gas at 3s. 6d. per 1000 feet, whilst the Chartered Company, with whom they amalgamated, required at least 5d. per 1000 feet additional in order to pay their maximum dividend; and in the case of the amalgamation with the Equitable Company in 1871, that company were in a position, as *appeared also by their accounts* (which were, of course, accessible to the Corporation and Board of Works), to sell gas at 3s. 4d. per 1000 feet, although the Chartered Company could not pay their maximum dividend at a price of 3s. 9d., which price was to be thereafter the standard price over the whole of the amalgamated districts.

They might also have added, to these two cases, the absorption, by the Chartered Company, of the Victoria Docks Gas Company, by paying a premium of 40 per cent. on their shares, which must also have received their sanction and approval.

Is it possible for incompetence to go further, than is shown by this detail of the proceedings of these two great bodies? For years past, they have subjected the ratepayers of the metropolis to the payment of enormous sums of money, in the prosecution of crude and ill-considered schemes, such as these referred to, which, so far from resulting in advantage to the consumers, have subjected them, according to their own showing, to heavy losses, whilst they have harassed the gas companies with perpetual attacks on their property, and have exposed them also to enormous expenditure in the defence of that property, the interest on which has also—ultimately—to be paid by the public!

The Metropolis Gas Act of 1860, which recognized the monopoly of supply by the London companies, was a well-considered Act, which secured to the public all that they could reasonably desire for their protection, whilst only fairly protecting the interests of the gas companies.

By that Act, every care was taken, to secure for the public a supply of all the gas that they could require for their consumption, under regulations for ensuring the greatest amount of purity with which it was capable of being manufactured, and at a price such as would return only a reasonable dividend to the companies, which could never be exceeded.

In case of their being able (as they have been) to earn a revenue more than sufficient to pay that dividend, the public had the benefit of all the increase, whilst even in the case of an unforeseen rise in the price of coal and other materials, only a limited margin in the increase of the price of gas was allowed by that Act, whilst all the accounts of the companies were required to be submitted to a public auditor appointed by the Government.

But for the cupidity of the Board of Works and the Corporation of London, and the agitation maintained from time to time against the gas companies by some prominent members of those bodies, there can be no doubt, that if the Act of 1860 had not been endeavoured to be tampered with, it would have secured to the public (possibly with some very slight amendments), the most ample protection, and, by saving the unnecessary expenditure of an enormous amount of capital, would have enabled the companies to sell gas cheaper than they are now doing, and also to sell their undertakings, if desired, at a far less sum than they could now afford to sell them.

Mr. Bright, when President of the Board of Trade, truly stated in the House of Commons, that there was no pretence for harassing the gas companies, as the Board of Works and the Corporation of London were constantly endeavouring to do—nor is there. It is not, and cannot be contended for a moment, that those companies have ever failed to fulfil honestly the conditions which have been imposed on them by Parliament, mainly at the instance of their present persecutors, who show from year to year, by their parliamentary proceedings, their utter incapacity to deal with the subject which they have taken in hand. Consumers of gas or any other commodity are very readily led to support any persons, who will hold out to them a prospect of cheapening the cost of the article which they consume, be it gas or anything else, and they do not take the trouble to inquire too closely into the grounds on which the promises of a cheapened supply are based. Thus, they are induced, without

inquiry, to place confidence in the promises and statements emanating from time to time from the Board of Works and the Corporation of London, but if they had only taken the trouble to compare those statements and promises with their results, and with the cost at which those results have been obtained, they would have abundant reason to agree with us in thinking, that if they had rested satisfied with the Act of 1860, and dealt fairly with the companies, they would be far better off than they now are, or are likely to be.

It should also be remembered that a very large number of the inhabitants of London are investors in the gas companies, and that in this great commercial city the maintenance of good faith with them should be a first consideration; for if investments, made on the faith of Acts of Parliament, are allowed to be tampered with from time to time, at the instance of great public bodies, representing the ratepayers of this metropolis, this must have the effect of shaking the public confidence in the security of those investments, and probably of driving capital into foreign countries, where good faith with the investor is more likely to be maintained.

The writer is himself a large holder of gas shares, purchased since 1868, on the faith of the provisions of that Act, which, he is told, have been faithfully fulfilled by the companies in which he has invested his money; and this being the case, he would venture to ask what pretence there can be for invalidating his security, and compelling him to adopt another, and more speculative, mode of investment, which, if it had been prescribed by the Act under which he subscribed his money, would unquestionably have deterred him from adopting such a mode of investment.

He would further ask, what justification there can be for asking Parliament in 1876 to alter the provisions of Acts deliberately passed in 1868-69, which provisions, so far from failing in the intention with which they were proposed and adopted, have admittedly fulfilled that intention, by enabling the investors under them to maintain, though not to exceed, the amount of dividends which, by those Acts, they were honestly authorized to receive.

Correspondence.

GAS-EXHAUSTERS.

Sir,—I have been much amused by the correspondence in your Journal on the subject of atmospheric pressure climbing mountains several hundred feet high; balloon ascensions; boilers, or Boyle's laws of boiling, &c. Pray do not be offended with my levity—I am a light subject; am never serious; am fond of laughing, as you may judge from my name.

I have also, in mortal shape, been up a high hill, and felt expanded, or rather blown, when I got there; champagne fizzed more than at the lower level, my nose bled, and I was rather deaf. I also felt exhausted, but my spirits expanded; the champagne, by the law of dialysis, got into my brain and made me reel; the candles we lighted (as mortals were with me), flared, but gave little light, and our potatoes were not cooked; our voices were dull, muffled. "What does it mean?" asked one. "Reduced atmospheric pressure," replied another. "Nonsense!" said an old gentleman; "there is no such thing as atmospheric pressure. Mercury stands some 30 inches high in the barometer—not by atmospheric pressure, but by the attraction of the vacuum over the mercury! I'll prove it. Can your 15 lbs. pressure on the square inch bend-in a circular box of cast iron an inch thick? Now look; in this little box I have fastened a glass tube, closed at the top; I fill it completely with mercury, and the little box half full, and then screw this solid plug of inch iron into the bottom of the box. Your atmospheric pressure cannot act through that? Now see; when I reverse the tube, the mercury stands as high in the tube as if the box was open at its base; and as your atmospheric pressure cannot act through the thick iron, the mercury remains suspended by the attraction of the vacuum at the top of the glass tube, and not by the pressure of the atmosphere." "My dear sir," said Laughing Gas, "you forget that you have bottled up the atmospheric pressure inside your box, and so established a momentary equilibrium of forces."

Another little story. One day, in my ethereal form, I got up a professor's nose and into his lungs, and, by the law of "diffusion," into his nerves and made him laugh, which (he being a serious man) offended him greatly, so that he made a grab at me, but caught one of my sisters. On her he played the inquisitor; he made her pass through the pores of a porous cell of a galvanic battery, and support a column of mercury of 13 inches in height. Another sister he made pass through white-hot platinum, which decomposed her rather, as she could not get through without leaving her black dress behind. He made her go through red-hot cast iron, clay retorts two inches thick, unglazed porcelain; but, on trying to make her get through a glass flask, she became obstinate and refused to go, but hurried away to gambol with the fairies over a marshy swamp, to the sweet music of croaking frogs. She belonged to the family of the will-o'-the-wisps, and I am her sister,

Laughing Gas.

REMOVAL OF CARBON FROM, AND A REMEDY AGAINST THE DEPOSIT OF CARBON IN, RETORTS.

Sir,—Exhaustion can diminish, but not prevent, the deposit of carbon in retorts, dialysis being the cause of it, as Mr. Joseph Tysoe very justly remarks in your number of the 14th of December last. As a consequence of this statement, the following questions present themselves:—

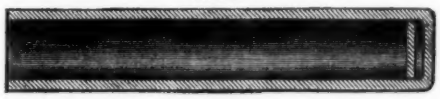
1. What are the means to remove the carbon in the speediest and easiest manner, and with the least damage to the retort?

2. Are there any means to prevent dialysis by making the retorts unpenetrable for gases?

I do not pretend completely to answer these two questions, but I might contribute to the solution.

As for the first, I believe that the usual methods of removing the carbon are tedious, tiresome, and prejudicial to the retort in the highest manner. As the carbon in the back end of the retort is the most difficult to be removed, I propose to place, at a distance of one inch from the back, a tile of fire-clay, as shown in fig. 1, making gas-tight the space between the back of the retort and the tile with some fire-clay put round about the latter. The carbon that will deposit on the tile can be easily removed by breaking the tile with a chisel, such as is commonly used to remove the carbon. When the back of the retort has been cleaned, the cleaning of the sides of the retort will be less troublesome. When the retort has been cleaned, a new tile is to be put in.

Fig. 1.



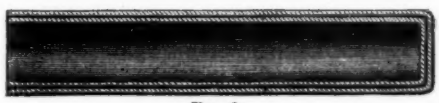


Fig. 2.

Fig. 3.

As for the second question, it has been tried to glaze the interior of the retorts; but as the glazing melts away, the useful effect of this method is of very little durability.

Now, my proposal is first to make a retort of half the usual thickness, to put then the glazing on the outer surface, and on this glazing to distribute the rest of the material to the usual thickness of the retort. By these means the section of the retort will be as shown in figs. 2 and 3, in which the black line shows the glazing.

I am aware that retorts made in this way will be considerably more expensive; but, on the other hand, when the deposit of carbon is avoided they will last, I am sure, more than double of the time they last now.

I should like some engineer to make an experiment with a retort of this description, and to publish his results in your Journal. If it prove successful, I am sure to have deserved the thanks of the whole gas world for my advice.

R. . . . . , Jan., 1876. C. T. S.

RAINFALL STATISTICS.

Sir,—Should you consider the accompanying figures within the scope of your Journal, and interesting to your readers, they are at your service.

The gauge stands 12 inches above ground, it is examined every morning, and the total added up each month. The whole, including gauge and graduated measuring glass, costs under 20s.

Rainfall, undoubtedly, has to do with gas consumption, as well as with the condition in which we get coal into store. I therefore think gas companies would be all the better were they to keep such records for comparing one period with another. George Anderson.

Rainfall in the Parish of Hanworth, Middlesex.

	1873.	1874.	1875.
January	2·210	0·770	3·395
February	1·250	1·235	0·870
March	1·385	0·250	0·460
April	0·430	1·170	1·670
May	1·015	1·220	2·000
June	1·970	2·915	3·135
July	1·895	1·120	4·375
August	1·675	1·035	0·550
September	1·714	3·330	1·910
October	1·630	2·885	3·200
November	0·686	2·235	2·840
December	0·410	1·465	0·810
Inches and decimals 40 feet above sea.	16·270	19·630	25·215

GOVERNORS TO LAMP-METERS.

Sir,—I perceive that Mr. W. Key, in his letter to the Journal last week, states that "Mr. R. W. Brett will learn from the manager, gas-works, Clitheroe, Lancashire, as to the practice adopted there of allowing for the reduced difference of pressure, at point of consumption, on those lamps to which meters are fixed, compared with non-meter lamps burning direct from the street-main without interruption."

Now, I assume that governors are used at Clitheroe, and, if so, either Mr. Key or Mr. Brett are in error. It is well known what the qualifications of an ordinary street-lamp governor are—viz., that it should pass a given quantity of gas, no matter what variations of pressure it is subjected to, so long as the pressure does not fall so low as to let the instrument go out of action. Why the governors do not compensate for the *reduced* difference in pressure, I cannot understand; and, if they do so, then the manager of the gas-works, Clitheroe, is, in my opinion, crediting his company with more gas than is in reality consumed by the lamps.

Frank Wright.

MALAM'S PROCESS OF GAS-MAKING.

Sir,—In reply to your correspondent "Gascon," the committee of the West of Scotland Association of Gas Managers request me to state that they have not been able to get Mr. Malam to allow them to test his process of gas-making in Dumfries Gas-Works, in compliance with the instructions they received at the Association's half-yearly meeting, held in Stirling last September.

Dumbarton, Jan. 7, 1876. James M'Gilchrist, Secretary.

GAS MANUFACTURE IN SCOTLAND.

Sir,—Will you allow me, through your valuable columns, to bring under the notice of the managing committee of the West of Scotland Association of Gas Managers, the omission that seems to have been made last year in not issuing their "Annual Statistical Report on Gas Manufacture in Scotland." I had a copy sent me for the previous two years, and I valued the information it contained as it was of considerable use to me personally in my professional capacity, the most interesting columns being those giving each town, gas made, price per 1000 feet, and leakage.

I have been making inquiry, and learn that no steps have been taken in regard to last year's report, because the managers of the lesser works are inclined to think a proposition to cause them to make numerous and minute calculations will be little better than useless, the original columns, as previously designed, being considered sufficient, and which they would readily fill up.

I hope the mangers of this institution, which has undertaken to carry out many laudable and useful schemes, will not let the "Annual Statistical Report" be killed with too much care, and that my friends may be able shortly to send me the usual report, now some time overdue.

A CONTRIBUTOR TO THE BENEVOLENT-FUND.

Jan. 1, 1876.

ASPHALT FOR PAVING.

SIR,—Could you, or any of your correspondents or subscribers, give me any information regarding the composition of *manufactured asphalt* used for footpaths, &c., or the best means of preparing it?

ASPHALT.

Jan. 3, 1876.

Legal Intelligence.

EDINBURGH COURT OF SESSION.—THURSDAY, JAN. 6.

(*Before Lord* SHAND.)

THE POLLUTION OF THE RIVER ALMOND.

WILSON *v.* YOUNG'S PARAFFIN OIL COMPANY.

A motion was made to-day in this case for interdict against the defenders, to prevent the alleged pollution of the river Almond by the discharge of refuse matter from their works. The motion was opposed, on the ground that the men of skill to whom the matter had been remitted for inquiry, had reported that the system of working recently instituted by the defenders had obviated the pollution complained of. The complainers, on the other hand, insisted, in a minute put in by them on the 27th of October last, to the effect that, as shown by certain facts therein stated, the system in question was insufficient for the purpose of preventing the pollution complained of, and also that the defenders had neglected to take proper precautions and measures to that end. The defenders, in answer to this statement by the complainers, offered to prove the sufficiency of their new system of working.

The LORD ORDINARY, in this state of the contentions between the parties, intimated that he would remit to the reporters to say whether the new system of working of the defenders was sufficient for obviating the pollution of the stream; and he would deal with the other question of neglect after he had first got the report of the men of skill on the question as to the sufficiency of the new machinery for the purpose in question. He would, however, call the case again next day, in order that he might meantime look into the similar interlocutors in the other cases as to the Almond.

FRIDAY, JAN. 7.

When the case was called on,

The LORD ORDINARY said he observed that the pursuer had a very specific statement of pollution, upon particular dates, in the minute of the 27th of October, and when he put it to the counsel for the pursuer, whether that was the thing that he adhered to, his lordship was informed it was. The statement was that on the 9th, 18th, and 19th of October, there was pollution, notwithstanding, of the defenders new works, and that the system adopted by the defenders was insufficient for its purpose, or otherwise the system was not adhered to in such a manner as to attain the desired end. Now, he could scarcely doubt, if these samples of water had been taken by Dr. Stevenson Macadam, as the pursuer said, the truth of this statement as it was made. And he wished to know, before doing anything else in the case, if the defenders had any explanation to offer as to whether that pollution was the result of accidental circumstances, which would not occur again, or if they denied it altogether.

Mr. BALFOUR, for the defender, said that their great difficulty in regard to this matter was, that the pursuer had not acceded to their request to let them know when he meant to make an examination, so that they might accompany him, or take other means to check results. The only explanation he could give of the pollution alleged in the minute was, that there had been some trickling of paraffin from some of the surrounding land, which had undoubtedly at one time been saturated with it. But the paraffin found in the water in these examinations was so slight as to amount to no more than what chemists called a "trace."

His LORDSHIP pointed out that Dr. Stevenson Macadam said the water of the samples was so impure as to be unfit for its primary uses.

Mr. BALFOUR replied that no doubt the slightest trace of paraffin would produce that result.

His LORDSHIP further observed that, assuming these facts to be without explanation, the pollution must have occurred through one of two things—either from the works having been insufficient, or from the defenders neglecting the precautions which would make the works available. If the defenders counsel did not wish opportunity of offering explanation on this matter, he proposed to issue an interlocutor remitting to Mr. Robertson and Professor Crum Brown to hear the explanations of parties in respect of the averments in the minute in question, and particularly its concluding part, and again to inspect the works, and in reference to what was said in the minute, to report whether the works are sufficient to obviate the pollution complained of, and whether any explanation occurred to them in reference to the pollution stated in the minute, assuming that such pollution occurred. In short, the parties and the reporters would understand that he wished as much light given him as they could afford, and that nothing should be excluded.

Counsel on both sides adopted this interlocutor as meeting their cases.

DUBLIN COUNTY QUARTER SESSIONS.

KILMAINHAM—WEDNESDAY, JAN. 5.

(*Before the Honourable* C. TRENCH. *Chairman.*)

DISPUTED GAS ACCOUNT.

Mr. *Robert Taafe*, of Idrone Terrace, Blackrock, was sued by the Alliance and Dublin Consumers Gas Company, to recover the sum of £6 6s. 4d., the amount of gas account from the 1st of June, 1874, to the 30th of September, 1875. The sum actually in dispute between the parties was 11s. 11d., the defendant admitting his liability for the residue of the amount now claimed. His case was that he was not liable for the quarter ending on the last day of September, as he had in the latter end of June turned the key of the gas supply-pipe, and from that date to the end of September no gas had been consumed on the premises.

Mr. J. O. BYRNE appeared for plaintiffs; also Mr. T. J. COTTON, superintendent of the company; Messrs. ENNIS and SONS for the defendant.

The defendant, his wife, and his domestic servant were examined in support of this case.

For the company it was shown that the inspector had visited the defendant's premises on the 7th of June, and taken the register of the meter. He visited them again on the 22nd of September, and took the register of the meter, and the difference showed that 2000 cubic feet of gas had been consumed in the interval.

The Meter inspector, Mr. *Connolly*, was examined, and deposed that he had examined the meter, and that it was in perfect order.

His WORSHIP held that the case for the defendant was not sufficiently proved, as the date of turning off the gas was not fixed, and none of the witnesses could swear positively that no gas had been consumed on the premises during the September quarter. The register was, by Act of Parliament, *primâ facie* evidence of the consumption of gas. He would, therefore, make a decree for plaintiffs for the full amount claimed.

Mr. *Taafe* announced his intention of appealing against the decision.

CROYDON COUNTY COURT.—MONDAY, JAN. 3.

(*Before Mr.* H. J. STONOR, *Judge.*)

ACTION AGAINST INCOMING TENANT FOR ARREARS OF GAS-RENT.

CRYSTAL PALACE DISTRICT GAS COMPANY *v.* SMITH.

In this case the plaintiffs sued for £20 0s. 6d., on account of gas supplied to a public-house, of which the defendant is landlord.

Mr. PARRY appeared for plaintiffs, and Mr. HARMSWORTH for defendants.

In opening his case, Mr. PARRY said the "Alma" was formerly kept by a Mr. Piper, who let it to the defendant, at which time the sum claimed was due for gas. The officers of the company called, on the day of this change, for the purpose of cutting off the gas if the accounts due were not paid. The defendant then asked them not to do so, promising that the account should be duly paid; in consideration of which promise the gas was not cut off. According to the Act of Parliament relating to gas companies, the gas must be cut off before four o'clock in the day; but it was after that time when the change took place, and then, as the brewers and distillers wanted all the money, the plaintiffs got nothing, and were told they could not have any, or cut the gas off.

His HONOUR observed that if they had cut the gas off, they would have been obliged, under the same Act, to supply the incoming tenant.

Mr. PARRY: He would have had to give notice, and also security.

Mr. *George Hunter*, collector, was then called, and deposed to calling for the amount due on the day the house changed hands. He then saw Mr. Piper, and, in consequence of what he said, he went away and called again in the afternoon, when he said he must cut off the gas if the accounts were not paid. The defendant asked him not to do so, as it would injure the business. Witness replied that his instructions were to cut it off if he could not get payment, when the defendant said he had the money, and would see that it was paid when the business was transferred. On those conditions witness allowed the gas to remain on. There were several persons there as representatives of the brewers, distillers, &c., and one of them said they could not allow the rates at all, but the water-rate was subsequently allowed.

Robert Borcock, a sub-inspector, in the employ of the gas company, gave corroborative evidence, and deposed to the accuracy of the amount claimed.

Mr. *William Smith*, examined, said he took the "Alma" of Mr. Piper, and was informed, three weeks before that time, that an account was owing for gas. He called at the offices of the company, and told them he hoped they would get the money before the change took place. He told the witness Hunter that he had money, meaning the money to pay for the house, and he imagined he would share with the rest. He offered to pay a deposit on his own account, but did not promise to pay the arrears. It was not a fact that the present action was defended by Mr. Holland, the distiller, nor was he (witness) indemnified against costs. Piper received £200 deposit on the business. Was summoned before the magistrates for the amount, when the case was dismissed.

By Mr. HARMSWORTH: The deposit was offered to the company for his own supply. Did not say he would see them paid. He left everything in the hands of Mr. Labram, his agent. The sum of £20 0s. 6d. was placed in Mr. Tighe's hands to pay certain rates.

Mr. *Hunter*, in reply to Mr. HARMSWORTH, said he did ask for the money several times. As a rule they got the money from the incoming tenant. Knew their remedy was against the outgoing tenant.

Mr. HARMSWORTH submitted to his honour that Piper was still liable, although the remedy might be bad, and no undertaking to pay on the part of any other person could be proved unless it were produced in writing.

His HONOUR observed that if a man said "Don't cut it off, I will pay you," it was a contract to pay, and a reservation of the exact sum was corroborative evidence of there being a substantive agreement. The company had it in their power to cut off the gas, and thus injure the house in such a way that the amount would certainly have been paid if it had been forced.

Mr. *Labram* said he was present when the change in the "Alma" proprietorship was made. He did not consider that Mr. Smith was at all liable for the debt due to the gas company, and he suggested that the amount should be placed in the hands of third parties; that the gas company should be seen, their debt compounded, and the balance handed to Mr. Holland. The third party, in whose hands he placed the money, was Mr. Tighe, the manager for the brewer, who, he considered, was the proper party to hold the money. No promise was made to pay the gas company in full. The solicitor of Mr. Holland protested against that, and the £20 0s. 6d. was not placed in his hands for the purpose of paying the account in full.

By Mr. PARRY: The brewers received their claim in full. Mr. Holland would have needed £600 or £700 to pay him in full, but did not get that sum. The money, however, paid to the brewer and the distiller absorbed all the cash that was paid by Mr. Smith for going into the house. He considered the gas company's bill ought to be compounded for, because it was one of Mr. Piper's bills. The £20 0s. 6d. placed in Mr. Tighe's hands was in case the gas company should have any claim against Mr. Smith.

Mr. *J. F. Tighe*, collector to Messrs. Nicholls, the brewers who supplied the "Alma," stated that he remembered the transfer of the house, on the 11th of August, from Piper to Smith, and was present during the whole of the proceedings. It was agreed that his firm was to be satisfied in full. The solicitor to Mr. Holland objected to the gas company being paid in full, and Mr. Labram suggested that a deposit should be placed in his (witness's) hands until they could compound with the gas company. He was to make a composition with the gas company, and hand the balance over. Afterwards, however, a notice in bankruptcy was served on Piper, which prohibited him from parting with the money. He was sued in the Court of Queen's Bench for the amount, and judgment was obtained against him. He produced the receipt of Mr. Holland's solicitor for the money.

Mr. *W. H. Lendon*, solicitor, stated that, at the time of the transfer of the "Alma," he was acting for Mr. Holland. He remembered the discussion with reference to the arrears of gas-rent, and he was instructed by Mr. Holland's gauger to object to that account being paid in full. He said: "Here is a claim for gas, and I do not see why it should be paid in full any more than Mr. Holland." He was present when it was agreed that the money should be held by Mr. Tighe, on the understanding that he should go next day and compound with the gas company. Subsequently an order was issued by the Court of Queen's Bench, and the money was paid over to witness.

Cross-examined by Mr. PARRY: He did not think he had seen Tighe since. He took proceedings without knowing whether Tighe had compounded or not.

Mr. PARRY hereupon submitted that a contract had been made out, but

His HONOUR said it appeared to him that had it not been for the implied promise on the part of Mr. Smith, the gas would have been cut off; and with a view of indemnifying him, the exact sum due to the gas company appeared to have been set aside out of the money paid. As to the only question he had to decide—namely, whether Mr. Smith had given a guarantee—he should reserve his judgment till the next court.

HAMMERSMITH POLICE COURT.—THURSDAY, JAN. 6.
(*Before Mr.* INGHAM.)

A DRUNKEN STOKER.

The Imperial Gaslight and Coke Company were summoned by Felix Kaminsky, a stoker at the Fulham works, for wages alleged to be due to him.

The *complainant* said he signed a paper for a week's notice. He claimed a week's wages, as he was discharged without notice.

Mr. M'MINN, who appeared for the company, produced an agreement which, he said, the men signed. They were to have a week's notice if they behaved themselves properly, but were to be discharged without notice if they did not. On Monday, the 27th ult., the complainant was drunk, and stopped the work of the gang.

Complainant said he was not drunk, and the work was not stopped through his fault.

Mr. M'MINN said he saw him drunk, and the work stopped. He told the foreman to discharge him.

George Cox, the foreman, said the complainant was under the influence of drink at the time. He stopped him as he was going out with two gallon bottles for beer, and told him to return to his work. Complainant, however, got out over a fence, and returned with the bottles. He had to draw three retorts. He drew two, but witness had to take off his clothes to draw the third. The complainant was at that time drunk. Witness discharged him, and told him not to come there again.

In reply to the MAGISTRATE, the *complainant* said he was paid up to the time of his discharge.

Mr. INGHAM dismissed the summons, and ordered the complainant to pay 5*s.* costs, which he hoped Mr. M'Minn would enforce.

LEEDS POLICE COURT.—TUESDAY, JAN. 4.
(*Before Mr.* BRUCE.)

STEALING GAS.

William David Stones, a mechanic, was summoned for having, on the 23rd of December last, unlawfully laid a pipe which communicated with another pipe, and thus conveyed to his dwelling-house gas which belonged to the corporation, without their consent. The defendant pleaded guilty.

The TOWN-CLERK (Mr. Curwood), who appeared to prosecute, said he had taken the most lenient course in summoning the defendant, who was a person in poor circumstances. The defendant might be indicted for the offence, and it must be known that in any other case he would adopt that course. The pipes had been disconnected, and a flexible tube supplied, so that the gas did not pass through the meter.

The *defendant* said he did not know he was doing anything very serious.

Mr. BRUCE said it was as well that people should understand that taking gas in this way was just as much stealing as taking a loaf or a sovereign. He fined the defendant £3 and costs.

DUDLEY POLICE COURT.—SATURDAY, JAN. 1.
(*Before Messrs.* ASTON, SMITH, *and* FISHER.)

SUMMONSES AGAINST A WATER COMPANY FOR DEFICIENT SUPPLY.

The South Staffordshire Water-Works Company were charged by the Corporation of Dudley with neglecting to supply Peter Clark and Philip Hughes (constables) with water for domestic use on the 11th of December last, the company not being prevented by frost, unusual drought, or other unavoidable cause or accident, or during necessary repairs.

There was also a charge against the company of neglecting to provide proper pressure, whereby the highest storeys in the houses could be supplied.

Mr. SHAKESPEARE prosecuted, and Mr. YOUNG appeared for the defence.

At the commencement of the proceedings, Mr. YOUNG said the water-works company had been at work in the most vigilant manner to discover the reason why the supply of water on Saturdays at Netherton was defective. It had been stated that it was due to the excessive draw, but the company had pursued their investigations further, and found that the defective supply was due to the water having to pass through a mining district with continual subsidences. The company had found that at Queen's Cross there was a waste of water in consequence of subsidences, and that had been attended to. On Friday, Dec. 24, which would correspond with an ordinary Saturday for home cleaning purposes, there was a good supply at Netherton. The company had tested their newly-acquired knowledge several times, and felt certain that they had now arrived at a solution of the difficulty. Under the circumstances, he asked for an adjournment for a month. If, at the end of that time, the corporation were not satisfied that the company had done all in their power, then the summonses might be heard. In conclusion, Mr. Young said he trusted that there would be no further litigation or cause of complaint, and that the new year would usher in a state of good feeling, which should prevail between the borough and the company.

Mr. SHAKESPEARE said he felt that he could agree to the suggestion of his learned friend. The only object of the corporation was to protect the public, and not to harass the company.

The cases—fifteen in number—were then adjourned.

TRURO POLICE COURT—TUESDAY, JAN. 4.
(*Before the Mayor, Mr.* C. CLYMA, *and other Magistrates.*)

CONVICTION FOR NEGLECTING WORK.

Nicholas Pascoe and *Henry Stodden*, stokers at the Truro Gas-Works, were charged with wilfully and maliciously breaking their contract of service on the 31st ult., knowing that by so doing they would, to a certain extent, deprive the town of gas.

Mr. R. M. PAUL appeared for the prosecution.

Mr. *James Greenaway*, manager of the works, was called, and stated that defendants were stokers, and belonged to a gang of three. They came to him and asked leave to change over with the other gang. He refused, because he thought the men would be off drinking, and would not be able to do their work on the following day. The other gang were also not willing to change. Notwithstanding his refusal, they took leave, and by neglecting their duty the town was left in a state of partial darkness. He had several complaints from shopkeepers, &c., and a letter had appeared in the *West Briton* of Monday justly complaining of the bad supply of gas. The managers of the works did not wish to press the charge, as they only brought the case forward to show defendants that they could not act as they had done, with impunity.

Mr. *Hamilton*, the secretary of the company, gave some statistics to show that the heats of the retorts had decreased, owing to the men's neglect of duty.

The defendants said they wanted to change, to spend a little time with their families, it being Christmas time.

The BENCH, after carefully considering the matter, said they thought from the evidence that their neglect was wilful, but, as the charge was not pressed, each of the defendants would be fined 1*s.*, and 9*s.* costs.

EDINBURGH POLICE COURT—TUESDAY, JAN. 4.
(*Before Sheriff* HAMILTON.)

PUNISHMENT OF DRUNKEN RECKLESSNESS.

Charles Lennox, a manager of the gas department at the Queen's Theatre, was charged with wickedly and maliciously annoying the proprietor, Mr. H. Levy, on Saturday, the 1st inst., by turning off the gas in the building.

From the evidence it appeared that the accused was, on the day in question, the worse for liquor, and that, having had some words with the manager as to wages, he threatened to blow the place to atoms. This happened just before the commencement of the afternoon performance, and Lennox went to the main meter and turned off the gas from the stage, thus causing great anxiety and annoyance to those behind the curtain. In relighting the jets the sudden blaze caused some portions of the scenery to take fire. The house was crowded at the time, but fortunately, the curtain being down, the audience was not aware of what had happened, otherwise, it was the opinion of the witnesses, there might have been a panic, resulting in serious consequences.

Evidence was adduced, on the other hand, to show that the accused was not the worse for drink, and that he only turned the lights down to the blue, as was his duty, and that they were not altogether put out.

Sheriff HAMILTON said he considered the charge was proved. The prisoner might be very glad the curtain was down at the time, and that the audience was not aware of what took place, as a panic might have ensued, resulting in serious loss of life. He imposed a fine of £2, with the option of 20 days imprisonment.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.—At the Meeting of the Board on Friday last, a memorial and letter were transmitted from the Vestry of St. Luke's, Middlesex, praying the Board to oppose the proposed amalgamation of the Independent Gaslight and Coke Company, the Imperial Gaslight and Coke Company, and the Chartered Gas Company, or, in the event of the proposal being carried into effect, to secure the limit of the maximum charge to 3*s.* 6*d.* per 1000 feet. This communication was referred to the Parliamentary Committee.

METROPOLIS WATER SUPPLY.

SIR EDMUND BECKETT ON THE WATER SUPPLY OF LONDON.

The following letter from Sir Edmund Beckett (Mr. E. B. Denison, Q.C.) has appeared in *The Times* on the subject of "Our Water Supply":—

Sir,—If Mr. Bailey Denton and Lord Camperdown had been hearing for a quarter of a century as much scientific evidence about water purity as I have, one of them would be less puzzled and the other less alarmed by the late report of the Rivers Pollution Commission and its contradiction to that of the Water Supply Commission of 1869. They would then have known that the late report is only what every person of experience in hearing such evidence could have predicted with certainty from the constitution of this commission.

As an illustration of what is called scientific certainty, and apparently believed to be so by Lord Camperdown, in these matters, I have heard eminent scientific men assert on their oaths—and they always add that these things are "not opinions, but facts"—that the water of a moderate-sized river receiving the unpurified sewage of half a million people was perfectly good potable water for a town not many miles below the sewage-supplying places. That is a specimen of what we may call the impurist philosopher's view of water.

On the other hand, is a school which maintains, with equal positiveness, the theory that no length of run (within such distances as we are practically concerned with) purifies sewage by oxidation, but that a particle of sewage, or whatever other learned name they call it, sent into the Thames at Oxford arrives as a particle of sewage at Hampton, and may poison a man in London. It is true that they do not quite like the proposition reduced to those very bare terms, but they cannot deny, when they are pressed by a little cross-examination, that it is the logical consequence of their theory.

Neither can they assert, when called upon to give some real evidence for their theory, that they have ever traced the smallest degree of illness in London to the drinking of the water now supplied from either the Thames or the Lea; and, again, they are obliged to admit that their method of testing for what may be called obsolete sewage is itself the subject of controversy among chemists. Yet there is not the least difficulty in finding indisputable evidence of the connexion between several diseases and the drinking of well water near drains, or the breathing of sewer gas. In other words, the latter are demonstrable facts and the former is an entirely undemonstrable theory.

It will not be a waste of time to give a rapid sketch of the course of inquiry and legislation respecting London water for the period I first mentioned, which, I think, I can do from recollection, though I have no papers to refer to here.

In 1851-2, in spite of the impurists, who, I remember, produced bottles of what they called perfectly good water, taken near the Tower, before the London drainage diversion, Parliament required the companies to move up above the tidal reflux to Teddington Lock, and also to filter their water. A few years after that the Conservators of the Thames were established, with the power and duty of cleaning the river superficially, and of compelling all the towns above London to divert all unpurified sewage from the Thames. Accordingly, some of the largest places have already done so, and others are doing it. Others have thus far opposed the Conservators with passive resistance or pretended efforts; but they are gradually being subdued by the prospect of tremendous penalties, which are only suspended. We read one such case in the law reports the other day, and I was myself engaged in another, I forget on which side; for I have acquired considerable impartiality by having been, probably, as often on one side as the other in water bills.

The London water companies, by various Acts, also pay the Conservators about £1200 a year each for thus cleaning the Thames for them legally and physically.

The Lea Conservancy was established—in 1869, I think—with much the same powers, after a long inquiry before a very strong committee in the Commons, which involved the whole question of what is sufficient purification of a river which has a long run below any place sending in any amount of filth. The purists and impurists had it out there, and contradicted each other as flatly as usual, and the purists failed as usual in proving any kind of bad effects from the Lea water, except in some circumstances of extreme carelessness or mismanagement. Several purification schemes already in action were considered; and the result was the Act, which was considered so fair a compromise, that there was very little opposition in the Lords. If the present Lea Commissioners do not do their duty, there are means of curing that, for I know that there is a strong London representation on the Board.

The same year there was another long parliamentary inquiry about the East London Water Company, which ended in their being allowed to supplement their sometimes insufficient supply from the Lea, by taking from the Thames and coming into the same bargain with the Conservators as the other companies.

Later, in 1869, came out the report of, what is usually called, the Duke of Richmond's commission on water supply, quoted by Mr. Bailey Denton. The purists were helped before that commission by several first-rate engineers, with magnificent projects for bringing the most unimpeachable water into London from several remote places. The late chairman of the Metropolitan Board was on the commission, and other thoroughly practical men, unbiassed by theories of their own. But the scientific men were heard, and in their proper place—*i. e.*, as witnesses, and not as judges. You might as well have expected an impartial report from Brunel on the merits of the broad-gauge, as from a philosopher with a theory about water.

There was also a still longer inquiry into the doings of the water companies, on a Bill of the Metropolitan Board and the Board of Trade in 1870, which ended in some legislation which seems to have caused nothing but expense to

London householders, some of whom had stirred up that agitation; but throughout that inquiry I remember no serious attempt being made to impeach the quality of the water—at any rate, it failed if there was.

The net result of all this is that every committee and commission consisting of persons unbiassed by theories of their own, and, in short, every one except this last, has come to the conclusion that the Thames and the Lea where now taken, and still more when the respective Acts are enforced, are and will be "perfectly wholesome and suitable waters for domestic use," and that there is not the smallest scrap of real evidence to the contrary; for the mere opinions of scientific men are not real evidence in matters which admit of demonstration, though we are obliged to put up with them, and popularly call them evidence in matters which admit of nothing better.

Perhaps it is worth while to mention also that in several very important inquiries in Parliament a very remarkable table has been produced of the death-rates of many towns and the hardness of their water, which goes a long way towards proving that great softness is apt to bring in some other noxious qualities.

If there were any bill pending, or likely to be pending, for enforcing this unique commission's recommendation and alarm, I should, for obvious reasons, be silent. For those reasons I am silent on the point, respecting which I believe there is a bill—viz., for enabling some metropolitan authority to buy up the water companies, beyond mentioning this fact—that, however desirable it may be to do it by agreement, Parliament has never yet authorized any corporation to take either water or gas works compulsorily, and has in several public Acts prohibited them from setting up works of their own against companies. Therefore, also, it has never entertained such a suggestion as that made by this commission—that any further powers should be refused to the water companies, by way of indirectly bullying them into giving up the Thames and the Lea to please a few theorists who have always been totally unable to prove their case when called upon to do it before impartial judges.—Yours obediently,

EDMUND BECKETT.

Bath, Jan. 7, 1876.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN THE YEAR 1875.—The following are the returns of the Society of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
	Grs.	Grs.	Grs.	Grs.	Deg.	Deg.
Thames Water Cos.						
Grand Junction . .	19·78	0·084	0·146	0·002	14·9	3·8
West Middlesex . .	19·32	0·044	0·146	0·000	14·5	3·6
Southwark & Vauxhall	19·89	0·082	0·151	0·002	14·8	3·8
Chelsea	19·59	0·077	0·142	0·001	14·8	3·8
Lambeth	19·78	0·085	0·150	0·001	14·8	3·8
Other Companies.						
Kent	28·03	0·007	0·366	0·000	20·9	5·9
New River	19·06	0·030	0·147	0·000	14·5	3·4
East London . . .	20·70	0·046	0·172	0·001	15·1	3·9

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours, and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—viz., in the case of all the Thames companies, except the West Middlesex.

These results are the averages of the analyses of the samples of water taken monthly from the mains of the several companies during the year, and they show that the total proportions of solid matter dissolved in the water have been as follows—namely, 19·67 grains per gallon of the Thames supply, 19·06 grains of the New River supply, 20·7 grains of the East London supply, which is chiefly from the Lea, and 28·03 grains per gallon of the Kent Company's water, which is obtained from deep wells in the chalk. The solid matter consists, in all cases, of a very large proportion (about two-thirds of the whole) of carbonate of lime, with a little carbonate of magnesia; and the other third is composed, in nearly equal parts, of sulphate of lime, common salt, and nitrate of magnesia. These substances, in the proportions in which they exist in the metropolitan supply, are of prime importance in a dietetical and sanitary point of view; for experience has shown that waters of a moderate degree of hardness, from the presence of calcareous salts, are more wholesome than those which are deficient of such substances. It is satisfactory, also, to know that the water supplied to the metropolis is remarkably free from organic pollution—the nitrogen, for example, which is present as actual or saline ammonia, does not exceed the 0·002 part of a grain per gallon of water; and in several cases, as in the Kent, the New River, and the West Middlesex Companies water, it is entirely absent. So also with regard to organic or albuminoid nitrogen, the proportion is exceedingly small—averaging, in the case of the Kent Company's water, the 0·003 of a grain per gallon; in the West Middlesex and New River Companies water, the 0·004 of a grain; in the East London water, the 0·006 of a grain; and in the rest of the companies, the 0·007 of a grain. Nitrogen, as nitrates, ranges from 0·147 of a grain per gallon of the water derived from the Thames, to 0·306 of a grain in the deep-well waters from the chalk. All these facts, together with the small proportion of alkaline chloride in the water, indicate a remarkable freedom from sewage or other organic pollution; and they fully sustain the high opinion entertained of the wholesome quality of the water supplied to London, as expressed in the reports of the scientific commission of 1850, the select committee of the House of Commons, 1867, and the Royal Commission on water supply in 1869, all of whom were specially appointed to investigate the quality of the water supplied to this metropolis. There is, moreover, a remarkable uniformity and constancy of the quality of the water supplied to London. Taking the last five years as an illustration of this, it will be found that the total amount of solid matter in the Thames supply has ranged from a yearly average of 17·98 grains per gallon to 19·67; in the New River water the range has been from 18·52 grains per gallon to 19·22; in the East London from 18·85 grains to 20·74; and in the Kent Company from 27·21 grains per gallon to 28·17. The same is the case with the individual constituents of the water, the most important of which show no sign of increase, but rather of decrease, in their proportions from year to year. If, therefore, in 1867 the select committee of the House of the Commons were, as they reported, "satisfied that both the quantity and quality of the water supplied from the Thames is so far satisfactory that there is no ground for disturbing the arrangements made under the Act of 1852, and that any attempt to do so would end in entailing a waste of capital, and an unnecessary charge upon the owners and occupiers of property in the metropolis," there is manifestly still greater reason to be satisfied with the quality of the water at the present time, when with more refined processes of chemical analysis it is found that the water is yearly improving. This will be more evident when the turbidity observed in the water supplied by some of the Thames companies is effectually removed by improved methods of storeage and filtration.

The quantity of water daily supplied to the metropolis has ranged from 31·9 gallons per head of the population to 36·9 gallons, the average for the whole year being 33·7 gallons per head per diem. Month by month the proportions have been as follows:—

1875.	Gallons per Diem.	Houses Supplied.	Gallons per Head, Daily.
January . . .	108,399,776	515,292	31·9
February . . .	109,527,033	515,346	32·2
March	109,352,343	516,514	32·2
April	113,045,907	517,200	32·8
May	121,543,736	517,489	35·3
June	127,381,916	518,127	36·9
July	122,319,088	519,063	35·5
August	125,186,742	519,569	36·3
September . . .	117,744,887	521,068	34·2
October . . .	117,744,907	521,068	34·2
November . . .	109,998,771	521,336	31·9
December . . .	111,420,340	521,566	32·3
Average . .	116,138,787	518,606	33·7

About half of the water is derived from the Thames, about one-third from the New River and the Lea, and the rest from deep wells in the chalk. The largest proportion of it, amounting to about 80 per cent., is used for domestic purposes, and, considering the requirements of a household, a daily supply of 26·8 gallons per head of the population, or about 180 gallons per house, is abundantly sufficient for all domestic and sanitary purposes.

HY. LETHEBY, M.B., &c.

BILSTON GAS COMPANY.

The Thirtieth Annual Meeting of the Shareholders of this Company was held at the Town-Hall, Bilston, on Monday, Jan. 3—WILLIAM HATTON, Esq., J.P., in the chair.

The CLERK (Mr. J. S. Reeves) having read the advertisement convening the meeting, the following report and statement of accounts were presented:—

The directors herewith present to the shareholders their thirtieth annual report, together with statement of accounts.

The trade account shows a profit of £3049 2s. 1d. This sum the directors propose to appropriate as follows:—

Half year's dividend of 4s. per share, paid Aug. 1, 1875	£1200 0 0
Half year's dividend of 4s. per share, payable Feb. 1, 1876.	1200 0 0
To reserve-fund	200 0 0
To next year's account.	449 2 1
	£3049 2 1

The directors have much pleasure in being able to present so favourable a report of the past year's operations, a result which is partly due to an increased consumption of gas, and partly to the easier terms upon which they have been able to purchase coals. The low prices, however, obtained for coke during the past year have operated unfavourably.

Your directors, having regard to the interests of their customers, have announced to the consumers of gas within the township of Bilston a reduction in prices from the 1st of October last.

During the past year important alterations have been made in the distributing plant, which will improve the supply of gas, and to some extent meet the increasing requirements of the consumers.

The purchase and enfranchisement of the land at Millfields have been completed, and arrangements made with the railway company for the construction of a siding. When the proposed communication with the railway is made, the erection of a new gasholder and other necessary works will be commenced.

The capital, works expenditure, and reserve-fund accounts are rendered herewith.

The directors who retire by rotation are Messrs. William Hatton, Elijah Price, and Robert H. Kearnes, who offer themselves for re-election.

The auditors, Messrs. T. H. Hickman and E. Ellis, also retire, and are eligible for re-election.

Dr. *Trade Account from Oct. 1, 1874, to Sept. 30, 1875.* *Cr.*

Stock	£666 18 9	Sales	£5,634 7 6
Purchases	3,224 16 9	Do.	5,195 9 2
Do.	2,934 12 6	Do.	2,613 9 2
Do.	1,570 19 3	Do.	2,779 11 6
Do.	2,552 1 4	Bank interest	29 6 4
Deterioration of works for one year	564 0 0	Stock	846 10 0
Allowances, discounts, &c..	199 0 7		
Wages	2,337 2 5		
Balance (profit)	3,049 2 1		
	£17,098 13 8		£17,098 13 8

Capital Account.

6000 shares, at £5 per share .	£30,000 0 0
	£30,000 0 0

Works Account.

Works as per published statement, 1874	£26,422 9 4	Balance	£30,473 13 6
Written off for deterioration for year 1875.	564 0 0		
	27,858 9 4		
Amount expended on works during 1875	399 4 2		
Lords of manor for enfranchisement of land at Millfields	126 0 0		
Balance of purchase-money for land paid since the 30th of September	2,090 0 0		
	£30,473 13 6		£30,473 13 6

Reserve-Fund Account.

Balance	£2,590 6 7	Balance, as per statement, published Sept. 30, 1874 .	£2,390 6 7
		Amount brought from profit account, Sept. 30, 1875 .	200 0 0
	£2,590 6 7		£2,590 6 7

The CHAIRMAN, in moving the adoption of the report, said it was a source of satisfaction to the directors to be able to present so satisfactory a report. The results were attributable to the diminished cost of coals and the increased sale of gas. The deficiency of gasholder storeage was to the directors a source of considerable anxiety, and he trusted that something would be done during the present year towards supplying the deficiency.

The motion was seconded, and carried unanimously.

A resolution, authorizing the payment of a dividend of 8 per cent. for the year, was approved.

The retiring directors and auditors mentioned in the report were re-elected.

The CHAIRMAN, in acknowledging the meeting's renewal of confidence in him, said that his association with the board during the last 29 years had been very gratifying, for a concern managed so satisfactorily to the shareholders, and so beneficially to the town, he had never known.

It was determined to hold the next general meeting on the first Tuesday in January, and the directors were authorized to invite the shareholders to a dinner, to be provided at the cost of the company.

Thanks were accorded to the directors for their services, in responding to

JOURNAL OF GAS LIGHTING, Tuesday, Jan. 11, 1876.

RETORT SETTINGS, No. 1.

FIG. 1

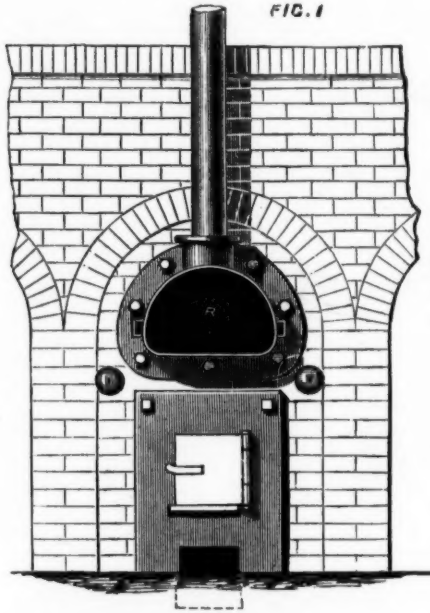


FIG. 4

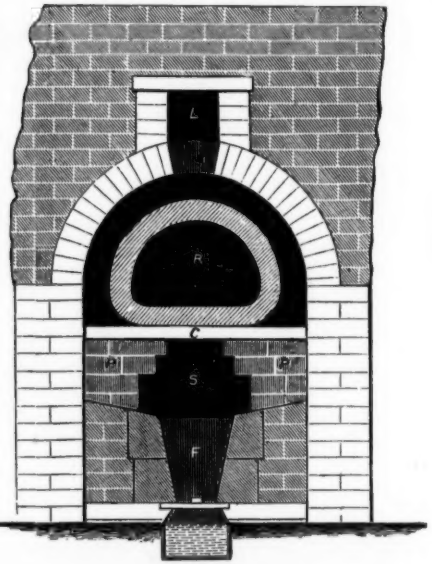


FIG. 2

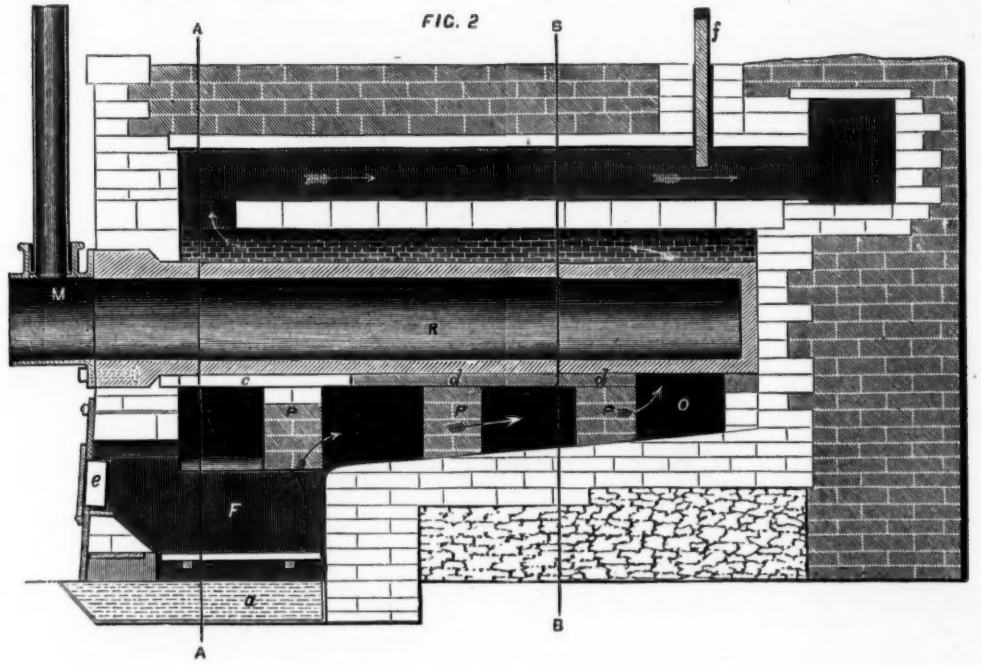


FIG. 6

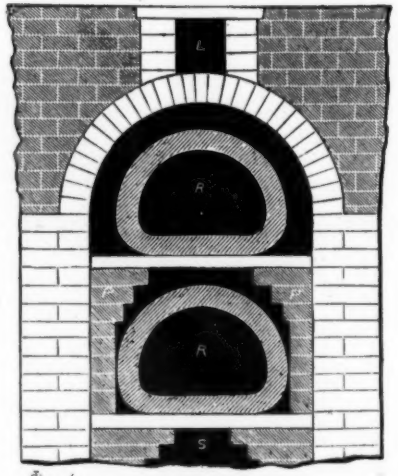


FIG. 5

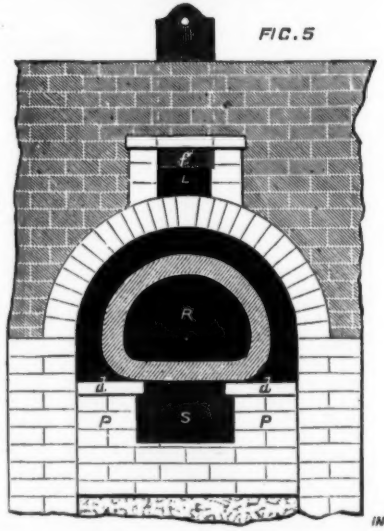
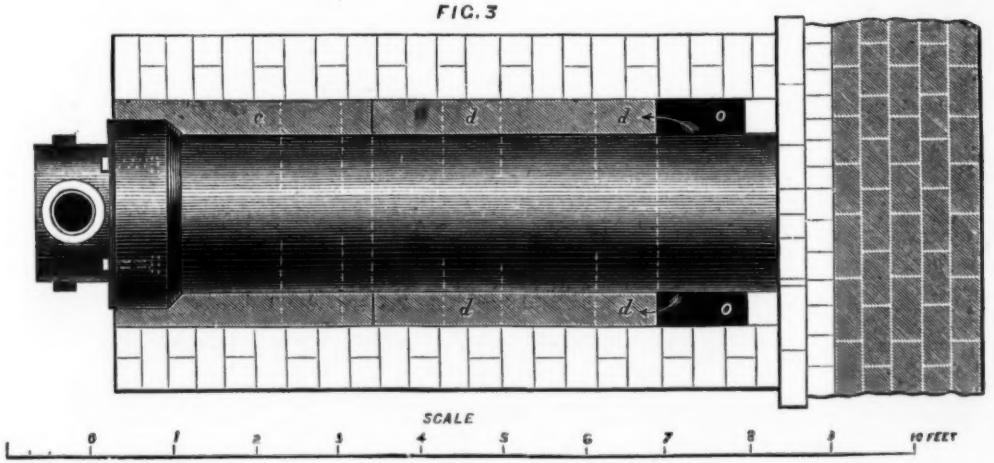


FIG. 3



SETTINGS OF ONE AND TWO RETORTS.

which the CHAIRMAN said the prospects of the company were now more gratifying than they had ever been.

The officers were thanked for their attention to the interests of the company, and the chairman for presiding.

WALSALL CORPORATION GAS SUPPLY.

PROPOSED EXTENSION OF THE GAS-WORKS.

On Monday Afternoon, Jan. 3, a special meeting of the Walsall Town Council was held in a field at The Pleck, adjoining the cemetery, and to the south-west thereof—the MAYOR presiding—for the purpose of meeting a deputation of owners and occupiers of dwelling-houses in the neighbourhood, who objected to the selection of the field in question as the site of the new gas-works.

Mr. KIRKPATRICK, on the part of the deputation, said they were opposed to the erection of gas-works in that locality, because it was a residential part of the town, and gas-works would interfere with the comfort of persons dwelling there, and would lower the tone of the whole neighbourhood. Twenty-eight years ago, when the gas-works were removed from the bottom of Rushall Street, a similar objection was successfully made, and the reasons which then prevailed ought to have tenfold force at the present time, the number of houses in the neighbourhood having increased from very few to very many.

Alderman R. W. BROWNHILL, chairman of the Gas Committee, then stated the reasons which had induced the council to select the site. These were, that it was the lowest site which they could find in the borough, and therefore there would be no necessity to force the gas to the higher levels; and it adjoined the canal, which was required for the conveyance of coal into the works, and for the conveyance away from them of coke and the other residual products; and that it was near to the railway, out of which a siding could be made for the conveyance of coal into the works. At present the haulage of coal from the railway station to the gas-works, in Wolverhampton Street, cost them £500 a year, and if they got a site near to the railway, but away from the canal, then they would lose £500 in that direction. Another reason for fixing upon that site, was that that part of the town had, to a large extent, been supplied hitherto by the Birmingham and Staffordshire Company, whose large mains were there. There would, therefore, be a loss in connexion with the laying down of other mains if the new works were placed on the other side of the town. With regard to the question of nuisance, he did not believe the gas-works would be any greater nuisance than the farm which stood in the adjoining field, because the tar and ammoniacal liquor, which years ago were allowed to run waste as things of no value, were now carefully preserved and sent away; because improved appliances would be used in the manufacture; because, by the use of oxide of iron, instead of lime, for purifying purposes, the purifying power would be increased; and because the escape of smoke, which at the present works had been greatly reduced, would in the new works be reduced to a minimum, by the application of improved smoke-consuming appliances. It was intended to use the present works to supply the town as far as possible, and to make what additional gas was required at the new works. Now that the advantages of this site had been seen, it might be depended upon that if gas-works were not erected there some other works would be; and iron-works, of which there were several on the other side of the canal, would be a greater nuisance than gas-works.

The MAYOR said the objections which had been raised were purely imaginary; the erection of the gas-works there would materially enhance the value of the land in the neighbourhood.

Mr. MADDOCKS, one of the deputation, asked if any member of the council would like gas-works to be brought near to his house?

Alderman BROWNHILL said he should not object; and, in fact, he had offered a part of his land.

The MAYOR said he should not object.

Alderman BAYLISS said he should not object to the works being brought much nearer to his house than was proposed by the council.

After further conversation, Mr. SIMPSON, one of the deputation, said if the undertaking could be carried out as Alderman Brownhill had stated, the circumstances of the case would be altered very considerably.

Other members of the deputation said they had signed the memorial against the erection of the works, under a misapprehension as to the site selected.

The MAYOR then thanked the deputation for having attended, and said he hoped that after the explanations of Alderman Brownhill—who was as great an expert as any man in the Midland Counties—the deputation would go away satisfied that they were not going to receive any injury, but that the expenditure of £30,000 or £40,000, which the council proposed to make, would increase the value of their property.

ROCHDALE CORPORATION GAS-WORKS.

The local retrospect for 1874, published by the *Rochdale Observer*, refers to the position of the corporation gas-works in that town, from which we make a few extracts:—

"As one of the reproductive departments of our town, which has in time past yielded, and will no doubt again yield, a handsome profit to the ratepayers, relieving in some degree the pressure of taxation, which is becoming seriously heavy, the public have always taken great interest in the progess and management of the gas-works. It is very much to be desired that a concern belonging to the burgesses, on which nearly £150,000 has been spent, should enjoy the support and confidence of the public, and it is because we feel that full justice has not been done to the management that we return to the subject on this occasion. We last year, in our retrospect, gave a tolerably detailed account of the works as remodelled by the present enginer, Mr. Hunter, we need not, therefore, go over the same ground again, our purpose is rather to show the progress which had been made, and some of the difficulties which have had to be encountered. The manufacture of gas is so peculiar, that an unfair critic, if he has venom enough, may fasten specious charges against the management, which the public, often ignorant of the true facts, may accept, and thus serious injustice be done to the manager or directors. For example, the plant of a gas manufactory must be so elastic in its resources as to be capable of producing, at a few hours notice, double or treble the quantity demanded only a few days before. If one million cubic feet per day be the ordinary winter consumption, the works must be capable of producing two millions per day, for a sudden demand arising from fog or other causes may require that quantity almost on the instant, without notice. On the other hand, in summer not one-tenth of the quantity will be needed. It is, therefore, obvious that a large capital must necessarily be sunk, which lies dead for more than half the year. There is no such thing as manufacturing in summer what may be wanted for the winter, scarcely a gas-work in the kingdom have storeage for even 24 hours consumption, and if they had, the gas would much deteriorate in quality by only a month's keeping. We mention these facts to show that the circumstance of a large capital being sunk in plant and apparatus, is quite consistent with the best and soundest management; the important question is, however, whether the principal increase should be in the productive power or in the storeage capacity. Now it is notorious that in Rochdale the weak point was a want of storeage power. Prior to 1871, the gasholder capacity was only 650,000 cubic feet, whilst the consumption in the winter months was often over a million cubic feet per day, so that we had never more than a few hours consumption of gas in stock, and frequently we were within half an hour of complete darkness.* The Gas Committee have now increased the storeage from 650,000 to 1,160,000 cubic feet, and when the holder in progress is completed, will have nearly 1,600,000 of holder capacity, which will enable the works to supply the public with an ample quantity, for, we fancy, the next ten years. The public will see at once how it happens that so large a capital has been sunk in providing these necessary reservoirs for the storeage of the gas. Again, the manufacturing of gas is strictly a scientific process, requiring great technical skill and knowledge, and continual improvements are being made in the process from year to year. To make gas to compete in quality and price with neighbouring towns, the latest improvements must be adopted, and apparatus of the most modern construction be applied. Unless we, in Rochdale, are content to be left far behind in the race of improvement, we must have the means of making gas as cheaply and as good as any works in the kingdom, and this the present management has always aimed at. Now, it is notorious, that when Mr. Hunter, the late manager, came to Rochdale, the works were, to put it mildly, very much behind the requirements of the times. These works were planned nearly 30 years ago, and were in many parts quite obsolete, and although the committee did their best to supplement the deficiencies of the older works from time to time by more modern appliances, still the works were scandalously deficient, and by these additions made extremely inconvenient and costly in working. The grave question, then, for the committee to consider was whether they would go on patching the already inconvenient premises, or at once remodel the whole works upon an entirely new plan. The committee, we think, acted wisely in determining to do the latter, and it was originally intended to spread the large cost over three or four years, and so make the alterations gradually. This latter course was afterwards found to be not only impracticable, but wasteful and extravagant, and it was determined to pull down and rebuild the works at once, upon the most approved and scientific plan. It is easy then to comprehend how about £50,000 has been spent since 1871 on the extension of the gas-works.

"Of the progress of the works we may say that the new gasholder-tank is proceeding satisfactorily, and the holder itself is contracted for to be fixed during the summer. Of the increase of the gas sold, and the revenue derived, our report is also satisfactory. The increase up to the 31st of March was upwards of 11 million cubic feet, and the money received up to that date was £9590 10s. 4d. in excess of the previous year, leaving a handsome profit, which is handed over to the improvement-fund, of £6070 6s. 10d. Last week the consumption reached the extraordinary quantity of 9,296,000, the largest quantity ever sent out in one week by the Rochdale Gas-Works, and that done without inconvenience or hurry. We may with justice give, in a tabular form, the increased manufacturing and storing power of the present works as compared with that of 1871:—

Manufacturing and Storing Power.

	1871.	1875.
Gasholder, capacity in cubic feet	650,000	1,160,000
Purifying power, in cubic feet	13,568	23,586
Scrubbing power, in cubic feet	3,267	9,040
Exhausting power, cubic feet per hour	85,000	120,000
Surplus retort power (in addition to providing for increase from 1871 to 1875)	None.	42 retorts.

Increase in Mains, Services, and Lamps.

Street-mains, in yards	100,950	116,000
Service-pipes or consumers, number	15,142	17,400
Lamps, number	876	1,450

"During the year a considerable reduction in the price of gas has been made. Last year the invoice price within the borough was 5s., with a scale of discounts which made the lowest price 4s. 3d. This year the invoice price is 4s. 4d., with a discount to largest consumers of 5d., making the lowest price 3s. 11d."

LIVERPOOL WATER SUPPLY.

On the 31st ult. the Members of the Corporation Water Committee and several of the officials accompanied the chairman to Northumberland Terrace, Everton, for the purpose of witnessing the formal opening of the valve controlling the supply to the only district not previously placed under the constant service system. The valve and meter having been exhibited, and the operation of the latter described by Mr. Deacon, the borough and water engineer,

Mr. WILSON, the chairman of the committee, said it was perhaps desirable that he should offer a few words of explanation. The work had been carried on quietly and satisfactorily, and he believed that no more important work had been carried out in Liverpool for many years, whether from a sanitary or a pecuniary point of view, than that which they had that day completed. The work, as they were well aware, was one which necessarily involved a considerable amount of expense; but that expense had been met out of revenue, and the committee started the year 1876 with the whole of the savings arising from the new system to the credit of their account. The work effected by the committee, partially with the assistance of the Health Committee, had been very great. They had taken the whole of the pipes and fittings out of 1674 courts, containing 9700 houses. They had removed drains from the inside of 1861 cottages, and they had put down in place of the old services 1800 stand-pipes. They had in another department supplied 19,607 stop-taps and boxes, and 190 meters, with the necessary fittings, and with the alterations of the mains. All this work, he was glad to say, was that day completed. The sanitary benefits arising from what they had done had shown themselves, he believed, on the death-rate of this town, but he believed they would show themselves yet more strongly. When it was considered that they had given the town a constant service of cool and pure water, that they had cut off the connexion between some 10,000 court houses and the mains, that they had prevented the contamination of the mains themselves, which necessarily existed under the intermittent service, he thought they would see that the new system must effect a very great change. A secondary point, but sufficiently satisfactory, was the pecuniary view of the case. They were delivering in 1875 two million gallons of water less per day than in 1871, in addition to which they were selling to new customers and the trade to the amount of £20,700 per annum. This, added to the amount of water they had in store, made a total of £23,200, of which, as he had said, they received £20,700 in cash. That, he thought, would bear out what he had said both as to the sanitary and the pecuniary value of the measure they had that day inaugurated. Perhaps they would allow him to state how it was the committee were driven to constant service and waste water prevention. At the close of 1871, Mr. Rigby and himself were respectively appointed deputy-chairman and chairman of the committee, and Mr. Deacon was appointed borough and water engineer. His first duty, when the responsibility of chairmanship devolved upon him, was to make himself master of the position; and this he thought he could explain very simply. The whole quantity of water they had the power of delivering, assuming that Rivington was overflowing, and the wells giving their full yield, was 128 million gallons a week. That was the maximum delivered in 1871, the average weekly quantity being 123 million gallons, so that they had only 5 million gallons left for the future. The average increase in demand was 3,500,000 gallons a week, so that absolutely in 1872 the town was within two years of coming to a dead lock. It then became necessary to take some steps, and the only thing which could be done, seeing that the time was so short, was to deal with the enormous waste which was known to prevail. He obtained the permission of the committee and of the council to try the experiment of localizing the waste by forming the town into districts. Meters were borrowed

* We understand that the largest turn-out of gas in winter 1874–5 was 1,721,000 cubic feet in 24 hours.—ED. J.G.L.

from the baths and elsewhere, and 14 districts were separated. It was found at once that they had enormous control over the supply, but that the defects of the system were two or three fold. In the first place, the cost of each meter and meter chamber was about £100, and the wear and tear of these meters were excessive. Previous to the introduction of the district system, the only check the committee had was that of sending officers down the various lengths of main with a pressure-gauge, and wherever a great falling off of pressure took place between two points they knew there must be some leak. However, the district system remedied that. At this juncture, Mr. Deacon came to their assistance, with the meter they now saw in operation. It was a very cheap meter and very effective, and it had many advantages over the meter in use before. In fact, it was to it that the great success of the day was entirely due. They had that day completed the constant service, but they had still a very important duty to perform—namely, to restrict the waste still further; and he trusted the public would remember that if the Water Committee seemed to be arbitrary in their proceedings, it was necessary the water supply of the town being in such a position that the town would shortly be dependent altogether on the further saving of waste, which could only be effected by a vigorous attack on all defective fittings.

The committee afterwards proceeded to Thirlmere Road, and inspected a leakage of water which had been discovered the previous evening through the operation of the new system. The leakage arose from the fracture of a pipe, and the quantity of water running to waste was estimated at 10,000 gallons an hour. It was stated by the engineer that several leakages of similar magnitude had recently been discovered in Everton since the new system had been adopted.

BIRMINGHAM WATER-WORKS.

TRANSFER OF THE UNDERTAKING TO THE CORPORATION.

[From the *Birmingham Daily Post*.]

In accordance with the agreement entered into between the directors of the water-works company and the corporation, the final step for placing the undertaking of the company in the hands of the ratepayers took place at the Water-works Office, Broad Street, on Saturday, the 1st of January, when the transfer was duly completed. The transfer was accomplished by a short conveyance, as brief as it was effective, consisting of not more than six or seven lines, the stamp on the document being of the value of between £5000 and £6000. The substance of the deed was to convey the whole of the company's undertaking to the corporation, in consideration of the latter paying annuities amounting to £54,491, and the handing over of a cheque for the sum of £3022 1s. 6d. After the legal gentlemen had carried into effect all the legal requirements for the completion of the transfer, Mr. Heaton, the chairman, on behalf of the company, expressed his pleasure at the goodwill which had prevailed between the corporation and the directors during the negotiations and proceedings for the acquisition of the undertaking, and the Mayor (Alderman Chamberlain) responded in suitable terms. Thus was concluded one of the most important transactions for the health and sanitary condition of the town which the corporation has ever taken in hand, and the gentlemen present at the transfer separated with mutual congratulations on both sides.

Now that the town has become possessed of the water-works, a short history of the company, and a brief description of the works, will be interesting. The company were incorporated, and the shareholders obtained their first Act, in 1826. Under this Act they had power to obtain water from the river Tame and from the Hawthorne Brook, but works in connexion with the latter were not executed, and the powers lapsed. The district to be supplied was what is now the borough of Birmingham and the parish of Aston. Among the original shareholders were Mr. Thomas Attwood, Mr. Richard Spooner, Mr. Joshua Scholefield, and Mr. Henry Van Wart, besides others whose names are well known in local history. The first service was laid on about April, 1831, the capital being then £120,000, in £25 shares. In 1851 the corporation obtained a clause in their Improvement Act, by which they were empowered to obtain, by compulsory purchase, all the works and interest of the company. In 1854 they gave notice of their intention to buy, but did not carry it out. The power of compulsory purchase consequently lapsed but they still had the power to buy the water-works by mutual agreement, with the subsequent consent of Parliament. In 1854 the water-works company obtained another Act to increase their capital to £240,000. It was in this year that a gas-tank burst at Willenhall, and the fluid from it ran into the river Tame, and poisoned the fish, rendering the river water for a time unfit for domestic use. Fortunately the company had notice of the accident, and were thus enabled to exclude the polluted waters from their reservoirs and pipes; but during the time the river was being cleansed the town was put to great inconvenience, water from private sources having to be carried round in carts to consumers for drinking purposes. Consequently, in the following year, 1855, the company again appeared before Parliament, and obtained another Act, the former ones being repealed. By this Act the capital of the company was increased to £420,000, and power was given to take the Perry Stream and the Hawthorne Brook (the Witton Stream), and the river Blythe, near Forge Mills. By about 1858 the works in connexion with the Perry and Witton Streams were executed, but the power over the river Blythe lapsed through not being executed in the stipulated time. In 1865 the company went again to Parliament to obtain powers to take water from Sutton Coldfield, at the point where the stream from the park passes under the Lichfield and Birmingham Turnpike Road, and to sink a shaft or well, and to drive a heading; but as the power to drive the heading was not granted, the company withdrew the bill. In the next year, however (1866), they again applied for additional powers, this time successfully, to take the same waters which rise in Sutton Park, but at a point 3½ miles down the stream from Sutton, called Plant's Brook Forge, on the Birmingham and Kingsbury Road, and to sink a well there, and to sink wells at King's Vale, near Oscott; Perry, near Holford Mill; Witton, at the upper end of Witton Reservoir; Erdington, near the railway station; and at Edgbaston. Power was also given by this Act to extend the district to be supplied, so as to include King's Norton, Yardley, and that part of the parish of Harborne not included in the hamlet of Smethwick; and to obtain, by agreement, from the South Staffordshire Water-Works Company the exclusive right to supply the parish of Handsworth. The share capital was increased to £756,000, and borrowing powers were taken. In this Act a clause was inserted to limit the supply of water for domestic uses from the river Tame, so that at the end of 1871 no more water was to be drawn from it for such purposes under ordinary circumstances, unless it should, from any cause, hereafter become impure, and be certified as so by the Board of Trade. In 1870 the company again went for additional powers, partly on account of the river Tame being prospectively cut off, and partly because one of the wells under the previous Act had not yielded so great a quantity of water as was anticipated. By this last Act the company obtained power to take the waters of the Blythe and Bourne, near Whitacre Junction, and to sink a well at Selly Oak, with increase of the district to be supplied to Northfield and Handsworth. The parliamentary limits of the late company, therefore, included the parishes of Birmingham, Edgbaston, Aston, King's Norton, Yardley, Handsworth, Northfield, and that part of Harborne not included in the hamlet of Smethwick, with a total amount of authorized capital (share and mortgage) of £945,000.

The rivers and tributaries over which the water-works company, and now the corporation, have control, are the Tame, Blythe, and Bourne Rivers, and Plant's, Perry, and Witton Brooks, extending over an area of 190 square miles of country. In addition to these sources, water is derived from four deep wells at Aston, King's Vale, Perry, and Witton, while a fifth well is in course of sinking at Selly. The supply thus yielded is collected and stored in 11 reservoirs, having an area of 85 acres, and capable of holding 197 million gallons of water; and there is power (which the company were about to exercise) to construct another reservoir on the river Bourne, between Whitacre and Shustoke, capable of holding 400 million gallons, in addition to the quantity already stated. The general scheme of collection and distribution is the gathering of the water into the various reservoirs at Whitacre, Perry, Witton, and Plant's Brooks; it then flows by gravitation, as required, into the Aston reservoirs, which lie at a considerably lower level. The Aston reservoirs are about 297 feet above the sea level, but the district to be supplied is still higher, and the water has, consequently, to be pumped up from Aston to the Monument Lane reservoir, 532 feet above the sea level, and finally to the Hagley Road reservoir, 602 feet above the sea level, or 139 feet above the level of St. Philip's Church. From these reservoirs the water is delivered by gravitation over part of the district, the rest being supplied from the mains through which the water is pumped up from Aston. For the purpose of distribution, there is a total length of 266 miles of water-mains laid in the streets of the borough and the neighbourhood; and the work of raising and pumping is done by 16 engines, of an aggregate of 2170 nominal horse-power, with 40 boilers. The quantity of water pumped at Aston and distributed during the year is about 3000 million gallons, and the quantity of coal consumed is about 24,800 tons per annum. The town and neighbourhood are divided, for the purpose of supply, into three districts—upper, middle, and lower; the upper district being supplied from Hagley Road reservoir, the middle from Monument Lane, and the lower will be from the reservoir now in course of construction at Erdington. The works are now capable of affording a daily supply of 17,300,000 gallons—namely, 9,800,000 gallons from wells, and 7,500,000 gallons from streams; but, in consequence of there not being duplicate pumping machinery at all the stations, and no engines at Selly Oak, the quantity that can be relied upon at the present time for distribution is estimated at 8,800,000 gallons daily—4,800,000 gallons from wells, and 4,000,000 gallons from streams.

THE LONDON COAL TRADE OF 1875.

Mr. J. R. Scott, the registrar of the London Coal Market, has published the following statistics of imports and exports of coal into and from the port and district of London, by sea, railway, and canal, during the year 1875:—

IMPORTS.

By Sea.	Ships.	Tons.	By Railway and Canal.	Tons.	cwt.
Newcastle	2,282	1,725,872	London and North-Western	1,080,495	2
Seaham	223	100,719	Great Northern	1,003,539	0
Sunderland	1,068	725,155	Great Western	583,505	8
Middlesbrough	27	13,682	Midland	1,666,333	0
Hartlepool	1,000	339,811	Great Eastern	677,113	15
Scotch	209	65,328	South-Western	33,871	8
Welsh	93	27,777	London, Chatham and Dover	6,501	0
Yorkshire	420	93,019	South-Eastern	14,093	9
Duff	5	2,071	Grand Junction Canal	4,594	10
Small coal	130	36,531			
Cinders	39	4,881			
Total	5,496	3,134,846	Total	5,070,046	12
During the year 1874.	5,238	2,727,719	During the year 1874.	4,695,769	2

Comparative Statement, 1874 *and* 1875.

By Sea.	Ships.	Tons.	By Railway and Canal.	Tons.
Jan. 1 to Dec. 31, 1875	5,496	3,134,846	Jan. 1 to Dec. 31, 1875	5,070,046
,, ,, 1874	5,238	2,727,719	,, ,, 1874	4,695,768
Increase in the present year	258	407,127	Increase in the present year	374,278

EXPORTS.

	Tons.	Tons.
Railway-borne coal passing *in transitu* through district		87,447
Seaborne coal exported to British possessions, or to foreign parts, or to the coast	60,949	
Ditto, sent beyond limits by railway	10,788	
Ditto, by canal and inland navigation	2,812	
		74,549
Railway-borne coal exported to British possessions, or to foreign parts, or to the coast	18,722	
Ditto, by rail beyond district		
Ditto, by canal and inland navigation	124	
		18,846
Seaborne coal brought into port and exported in same ships		2,606
Total quantity of coal conveyed beyond limits of coal-duty district during December, 1875		183,448
Ditto, December, 1874		156,452

Comparative Statement, 1874 *and* 1875.

	Tons.
Total distribution of coal from Jan. 1 to Dec. 31, 1875	1,827,124
,, ,, ,, ,, 1874	1,736,960
Increase in the present year	90,164

General Statement, 1874 *and* 1875.

	Tons.	Tons.
Increase in coals imported by sea during the present year	407,127	
Ditto by railway	374,278	
		781,405
Deduct increase in coals exported		90,164
Total increase in trade within the London district during the present year		691,241

The following remarks from *The Times* are on the coal trade in London during 1875:—

"The gross imports for the year 1875 of coal brought by sea and railway conveyance, within the limits of the London district (a radius of 15 miles round St. Paul's), exhibit the extraordinary total of 8,204,892 tons, and suggest an increase in supply over that of the year 1874 of no less a quantity than 780,000 tons. This may be taken as an indication of a revival of trade in London, together with an extension of the supply of railway-borne coal to remote country districts in the south and south-west. We may apportion the distribution of this unprecedented increase as follows:—100,000 tons may be considered as representing the growing expansion of the through trade for country consumption. The remaining portion—viz., 700,000 tons, may be allowed as absorbed, firstly, by the extension to our ever-increasing population of the use of gas; secondly, to household consumption in the gradual extension of greater London; and, thirdly, to the increasing use of coal for steam purposes as applied to manufactures, the iron industries in shipbuilding (in which no sign of revival appears) alone excepted. The trade in coal to London during the past year has been subject to far less fluctuation and uncertainty than for a year or so previously. Prices have ruled somewhat high comparatively, yet not more so than might reasonably be expected when the greatly increased cost in every form of getting coal is taken into consideration.

"We conclude by pointing out the somewhat significant fact that, for the first time for many years, the seaborne imports exhibit a larger increase of supply than their rivals in competition, the railways, the former ranking for an increased quantity of 407,000 tons, while the latter exhibit the still satisfactory increase of 374,000 tons over last year."

AMERICAN GASLIGHT ASSOCIATION.

[Condensed from the Report in the *American Gaslight Journal*.]

(*Continued from page* 18.)

WEDNESDAY, OCT. 20, 1875.

At the Evening Sitting, Professor CHANDLER, of Columbia College, delivered a lecture on "Illuminating Gas."

After some introductory remarks, the learned professor proceeded as follows:—

It is interesting to consider the condition of mankind before the introduction of coal gas, when wood fires, pine torches, and rushlights were the most convenient, because the only, means of obtaining artificial illumination. Lamps were finally introduced, but they were simply open, smoky lamps, in which crude animal or vegetable oil, or petroleum, was burned without a chimney. They were burned by means of a wick, and often, when it was desired that the lamps should never go out, as in the temples, wicks of asbestos were used. The custom of maintaining fires or lamps which should never be allowed to go out arose, undoubtedly, from the difficulty of kindling a fire without matches, or even steel.

The manufacture of candles was coeval with the persecution of the early Christians. Forced to seek hiding-places in the caves and catacombs, the want of artificial light was necessarily felt, and it is supposed that with them first began the use of modern candles. Even in the sixteenth century wax candles were used to a very limited extent, and as late as the year 1800 they were considered a great luxury. Cheaper candles were made of tallow, with a twisted tow wick. At a later period spermaceti and stearic acid (1820) were introduced.

Among the first great improvements in lamps was the addition of a flat socket for the wick, which was made to move up and down by means of a horizontal spindle and toothed wheel, which could be turned by the fingers as required. This was known as the Worms lamp. A still greater improvement was the Argand lamp, which had a round hollow wick and a chimney. This improvement was made in the latter part of the eighteenth century. The Carcel lamp was introduced in 1800.

During those early times, either to secure safety from fires, or else to prevent political meetings, lights were extinguished by law at a certain hour at night. In fact, the curfew bell, which rang at eight o'clock, was the signal of the authorities to the people to put out their lights and go to bed. This would seem to us great hardship, but to our early ancestors it was comparatively of little consequence, for as they could neither read nor write, they had very little use for lights after that hour.

There is another phase of this question which is very interesting, and I will simply allude to it in passing. The advantage which we get from having our streets well lighted was almost entirely unknown until the introduction of coal gas. In early times laws were enacted to compel persons to put lights in their windows, in order to light the highways. In the fifth century the streets of Edessa and Antioch were lighted by dim lamps, placed in the windows of the houses. In 1525 the English Parliament passed a law, compelling persons who lived upon the street, to place lanterns in their windows. In 1716 this law was re-enacted and enforced, and it required lamps to be burned from six o'clock until eleven, having a penalty for each failure to keep them so burning. An enterprising person contracted to do the work at 6s. per annum for each householder. In 1662 Laudati organized a corps of link or torch boys, to accompany pedestrians at night, charging from three to five sous per half hour; the boys being provided with half-hour glasses to mark the time. In 1667 Nicholas de Reynio, Lieutenant-General of Police in Paris, stretched chains across the streets, and hung glass lanterns upon them. This marks an era in street lighting. Still these lights seemed only to make darkness visible. They were oil-lamps with one or two wicks, but no chimney. Accum stated to the House of Commons that two of their lights were equal to one "tallow dip." In fact, till our streets were lighted by gas, footpads and burglars held sway during the hours of darkness, and single pedestrians rarely ventured out at night.

The Early History of Gas.

About the beginning of the seventeenth century, Van Helmont noticed that when animal or vegetable substances were heated in closed vessels, vapours or spirits were obtained which burned with a bright flame. Some time previous to 1691, Dr. John Clayton prepared gas from the bituminous coal of Wigan, collected it in bladders, and burned it for the amusement of his friends. In 1726, Dr. Stephen Hales made similar experiments with Newcastle coal. The Bishop of Llandaff showed, in 1767, how gas evolved from coal might be conveyed in tubes, and in 1786, Dr. Pickel, Professor of Chemistry at Würzburg, lighted his laboratory with the gas obtained by the dry distillation of bones. In 1787, Lord Dundonald, of Culross Abbey, in Scotland, took out a patent for making coal tar, and erected ovens for the purpose. The coal gas produced was burned at the Abbey as a curiosity. The real inventor of practical gas lighting was William Murdoch, who, in 1792, lighted his house and office at Redruth, in Cornwall, with gas made from coal, and astonished his neighbours still more by adapting the new light to a small steam carriage in which he rode to and from the mines. He soon removed to Scotland, and, in 1797, lighted his premises at Old Cumnock, in Ayrshire, with coal gas. In 1798, he constructed gas-works at the shops of Boulton, Watt, and Co., at Soho, and first publicly exhibited the gas in 1802 at the Peace of Amiens, when he showed two enormous flames of coal gas, burning from two copper vases, at these works. In 1805, the cotton-mills of Phillips and Lee, at Salford, were lighted with gas by Boulton, Watt, and Co., under the direction of Murdoch; and at about the same time, the mills at Sowerby Bridge were lighted by the same firm, under the direction of Mr. Clegg. In 1799, the French engineer, Le Bon, took out a patent in France for making gas from wood, with which he proposed to light Paris. In 1804, Winsor lectured on gas at the Lyceum Theatre in London, exhibiting the gas, but making a great mystery of the process. He finally obtained permission to light a few street-lamps with gas in Pall Mall, which he did in 1809, and organized the National Light and Heat Company, applying for a charter, which was refused. A great newspaper war was then initiated by him, in order to create a popular interest in the new light. In 1810, Parliament authorized the King to grant a charter within three years.

On Dec. 31, 1813, Westminster Bridge was lighted, and soon after the oil lights in the streets of St. Margaret's, Westminster, were replaced by gas, and the next year, 1815, Guildhall was lighted. Still, prejudice against the new light was so intense, even on the part of men of science, that it seemed at one time to present an insurmountable obstacle to its further progress. Davy (afterwards Sir Humphrey) ridiculed the idea, by asking if it were intended to take the dome of St. Paul's for a gasholder. The popular ignorance, with regard to gases in general, was so great, that when gas was finally admitted into the House of Commons, the architect directed that the pipes be placed 4 or 5 inches from the walls, lest their heat should fire the building. Popular prejudice was by no means the only obstacle to the introduction of gas lighting. The apparatus and machinery had to be invented; men had to be instructed to make them, and others to use them. Suitable pipes for distributing the gas could not be obtained. Wood and paper were patented, gun-barrels were screwed together, till, finally, wrought-iron pipes were supplied. In 1822 there were four great companies in London, using 1315 retorts and 47 gasholders, and making 397 million cubic feet of gas annually. Now, every large city in the civilized world is lighted by gas, giving rise, with the collateral business of making the fixtures, burners, &c., and working up the waste products, to one of the most extensive industries.

The manufacture of gas was first attempted in the United States at Baltimore, without success till 1821. It was introduced in Boston in 1822, and in 1823 the New York Gaslight Company was started, though it was not in successful operation until 1827.

There are now probably 700 to 800 companies in the United States, with an aggregate capital of 70 million dols. or more.

Materials Used for Making Gas.

A great many materials have been introduced for the manufacture of gas, but, until very recently, coal has been the only material that has been used to any extent on a very large scale. All vegetable and animal substances, when exposed in close vessels to a red heat, undergo destructive distillation yielding gas, water, and tar, and leaving a residue of charcoal or coke. A few only are adapted for the economical production of illuminating gas. Bituminous coal is the material generally selected, though under certain circumstances several others have been, and are even now, employed. The most important of these are petroleum, or some of its less valuable products (as naphtha or residuum), resin, wood, peat, cheap oils, and fats. The mixture of hydrogen and carbonic oxide called "water gas," produced by passing steam over red-hot coke, charcoal, or anthracite, or a mixture of steam and petroleum vapour or gas, through a red-hot retort, has been, and is now, employed with success in the manufacture of illuminating gas, its want of illuminating power being supplied by rich gases from other materials.

This subject is doubtless familiar to you all, though many of the figures I shall give were obtained some years ago by the officers of the Manhattan Company, a company which has always been foremost in making chemical investigations into the nature of the materials and products of this industry. They developed important facts concerning the character of the gas, and the quantity obtained from different varieties of our ordinary coal. What we call caking coals, gives us a considerable quantity of a rather low quality of gas, and cannel coals give us a much richer gas, as is shown by the table I have prepared here.

Coal gas is made from bituminous coal. The following are the most important varieties of mineral coals:—

1. Anthracite.
2. Bituminous—non-caking, caking, cannel.
3. Lignite, or brown coal.

In addition to these coals there are bituminous shales, such as Boghead mineral, from Scotland, the "Hartley mineral," called by mistake Wollongongite, from Australia, and the paper shales from Germany. There are also asphaltic minerals, which, while they are never used alone, are very important when added to poor coals, to the extent of 5 or 10 per cent., as enriching materials, for the purpose of improving the quality of the gas. The most important of these asphaltes are Albertite, from Nova Scotia, and Grahamite, from West Virginia. These asphaltes produce large quantities of extremely rich gas; but their cost limits the quantity that can be used. Next to these in quantity and quality of the gas, come the rich bituminous shales above mentioned; but they, too, are not found in sufficient quantities to be used alone. Of true coals the cannels yield the richest gas, and in England they are sometimes used exclusively. The caking coal is, however, the chief material employed. The advantage of this variety of coal is due to its abundance and consequent cheapness, and to the fact that, when heated, it undergoes a kind of fusion, and furnishes a compact porous coke of great value as fuel.

The gas from caking coal is inferior in illuminating power, but this deficiency is supplied by the use of a certain proportion of richer cannels and other enriching materials. The table which you see here illustrates the character of a few of the important gas coals and enrichers.

The per centage of sulphur in gas coal is a matter of considerable importance, as, while about half of this sulphur remains in the coke, the other half passes into the volatile products, and is divided between the gas, the ammonia water, and the tar. As the sulphur contained in the gas must be removed in the process of purification, the cost of this part of the process increases with the per centage of the sulphur contained in the coal. The sulphur is present in the coal chiefly in the form of iron pyrites. Some American gas coals contain considerable per centages of sulphur. The Nova Scotia coals (Glace Bay, Bridgeport, International, &c.) contain from 3 to 5 per cent.; Redbank, Pa., 0·89; Westmoreland, Pa., 1·50; Murphy's Run, West Virginia, 1·88 to 3·06; Orrell, England, 1·75 to 2·34. The last column in the table shows the number of feet of gas purified by one bushel of lime, which is a tolerable indication of the amount of sulphur which goes into the gas:—

——	Volatile Matter.	Fixed Carbon.	Ash.	Gas per Ton of 2240 lbs. in Cubic Feet.	Candle Power of Gas.	Coke per Ton of 2240 lbs.		Gas Purified by 1 Bushel of Lime, in Cubic Ft.
						Lbs.	Bhls.	
1. *Caking Coals:*								
Newcastle, England .	32·70	65·55	1·75	10,057	10·11	1536	49	3500
Glace Bay, Cape Breton	..	..	..	9,560	12·50	1484	38	1945
Lingan " .	35·20	60·80	4·00	9,520	12·92	1450	42	2200
Block House " .	40·80	57·70	1·50	10,217	17·32	1460	40	2304
Pittsburgh, Pa. . . .	36·76	51·93	7·07	..	..	..	..	..
Westmoreland, Pa. .	36·00	58·00	6·00	10,642	16·62	1544	40	6420
Sterling, Ohio. . . .	37·50	56·90	5·60	10,528	13·81	1480	36	3993
Despard, West Va.. .	40·00	53·30	6·70	10,765	20·41	1540	36	2494
2. *Cannel Coals:*								
Kirkless Hall. Englnd.	40·30	56·40	3·30	10,012	21·47	1410	36	2000
Darlington, Ohio . .	43·00	40·00	17·00	9,800	34·98	1320	32	2806
Peytona, West Va.. .	46·00	41·00	13·00	13,200	42·79	1380	32	4510
3. *Enriching Materials:*								
Boghead Mineral, Scot.	51·60	15·70	32·70	13,619	26·45	1378	35	3400
Grahamite, West Va..	53·50	41·50	2·00	15,000	28·70	1056	44	..
Albertite, Nova Scotia	57·70	41·90	0·40	14,784	49·55	806	16	..
Hartley Mineral, Aust.	82·50	6·50	11·00	13,716	131·00	424	..	5686

The Manufacture of Coal Gas.

The manufacture of coal gas includes three distinct operations:—1. The distillation of the coal. 2. The separation of the water, tar, and other condensable matter—condensation. 3. The removal of sulphur compounds and carbonic acid—purification.

The distillation of the coal is effected in the retort, which is a long, horizontal, semi-cylindrical vessel, formerly made of iron, but now made of clay, in some localities being opened at both ends, and charged at both ends, though generally they are charged at one end. They are set in groups or benches of three, five, six, or seven, heated by one fire of coke. In Paris, the Siemens regenerating furnace has been introduced for heating gas-retorts. At the Vaugirard station, one furnace furnishes fuel for 128 retorts, set in benches of eight, with regenerating chambers beneath each bench. The saving in fuel is said to be about 29 per cent.

The work of charging the red-hot retorts, and drawing the coke, is very laborious and exhausting, and an effective machine for performing this duty has been invented by Mr. T. F. Rowland, of Greenpoint, N.Y. The working model certainly accomplishes all that can be desired.

The intensity and duration of the heat to which the coal is exposed are matters of great importance. For iron retorts a dull cherry (1478° Fahr.) to a clear cherry-red heat (1830° Fahr.) is most suitable. For clay retorts a deep orange (2010° Fahr.) to a clear orange (2190° Fahr.), or even a white heat (2370° Fahr.) is employed, the coal itself being exposed in either case to 1500° to 1600° Fahr. The effect of too low a temperature is to produce a larger proportion of condensable vapours, which are lost in the form of tar, while too high a temperature injures the quality of the gas, by decomposing it into non-luminous marsh gas and hydrogen. When the charge of 160 lbs. or 200 lbs. of coal is first introduced into the hot retort, the outer layers only of the coal undergo distillation, yielding condensable vapours very rich in carbon; these, passing through the red-hot retort on their way out, are decomposed into fixed gases of high illuminating power. As the heat continues, these outer layers of coal become converted into coke, which is soon raised to a red heat. In the meantime, the heat reaches the interior of the charge, and the vapours produced, passing through the red-hot layers of coke, are in turn converted into fixed gas. As each successive portion of vapour has to pass over a larger surface of red-hot coke, it is more and more completely decomposed, and its per centage of carbon, and, consequently, its illuminating power, reduced. For this reason the quality of the gas deteriorates as the process of distillation continues, till, finally, little besides hydrogen is evolved. At the last stages of the process, the sulphur contained in the coke is said to form bisulphide of carbon, which is a most objectionable impurity. It is considered better, therefore, to interrupt the process at the end of four hours, than, by continuing it, to impair the quality of the whole product by the poor gases of the latter stages of the distillation. To prevent the reduction of the illuminating power of the gas by too high a temperature, it is also necessary to remove the gas from the retort as soon as possible, and not to permit its pressure to be increased by obstacles to its ready escape. For the accomplishment of this object an exhauster, or gas-pump, is employed, not so much to suck the gas out of the retort (the partial vacuum produced in the retort rarely exceeds one inch of water column in the pressure-gauge) as to push the gas ahead through the condenser, washer, and purifiers into the holder, and thus make room for more gas to follow from the retort. The effect of too low heats is shown, to an exaggerated degree, in the comparison of results which you see on this diagram, obtained from the same coal when distilled at a bright red heat for gas, and at a heat hardly red (750° to 800° Fahr.) for coal oil. One ton of 2240 pounds of Newcastle coal yielded:—

1. When distilled for gas, at a high temperature—		2. When distilled for oil, at a low temperature—	
Gas . . .	7450 cubic feet.	Gas . . .	1400 cubic feet.
Coal tar . .	18½ gallons.	Crude oil . .	68 gallons.
Coke . . .	1200 lbs.	Coke . . .	1280 lbs.

The Condenser.

The condenser consists of a series of iron tubes placed in the open air, or more commonly, in cisterns of cold water. By a simple contrivance the tar and ammonia water which separate from the gas as it traverses the condenser, readily flow off into their respective wells. From 50 to 100 feet of tube surface is allowed for every 1000 feet of gas to be cooled per hour. At the works of the New York Gaslight Company, a multitubular condenser is in use, consisting of two sets of 8 boxes, each containing 100 tubes, 3 inches in diameter, and 15 feet long. The gas passes up in one set of tubes and down in the next, through the entire series of 16 boxes, thus traversing 240 feet of 3 inch pipe, cooled by a constantly changing water supply outside. The action of this condenser is more than its name implies. While the warm gas contains steam and various condensable vapours, which are liquefied and separated here, it also bears along a considerable quantity of tar in the form of globules, spray, or fog, too minute to be deposited by gravity. This tar is already condensed to liquid, and it requires for its separation actual contact with a bath of tar, as in the hydraulic main, or with surfaces wet with tar, as in the tubes of the condenser; the tortuous journey is also favourable to the licking up of the tar globules by the tarry surfaces.

The Washer.

The gas next enters the washer, and then, at many works, a scrubber, both designed to render more complete the separation of the tar and ammonia, and also to separate some of the sulphur compounds. The washer consists of a series of compartments through which the gas passes, and where it is exposed to jets of water. At the East Side works of the Manhattan Company, the washer consists of a series of 36 cells, 3 feet square and 10 feet high, each supplied with two jets of water, which enter at the side, and are thrown into spray by impinging against an iron plate. The gas passes through the entire series.

The Scrubber.

The scrubber is a large chamber partially filled with coke, fragments of fire-brick, or paving stones, which are kept constantly wet by a spray of water.

Apparatus of St. John and Rockwell.

I call your attention to an apparatus which has been brought into very successful use in this city, which it will be worth your while to see. It is the apparatus of St. John and Rockwell for taking the place of the ordinary washing apparatus. In the ordinary process the gas from the retort is passed through the condenser, washer, and scrubber. The object of the condenser is simply to cool the gas, and permit as much as possible of the tar and ammonia water to separate, the former by adhering to the surfaces, the latter by condensation. The free use of water on gas is found to be objectionable, as some of the rich gases and vapours present are dissolved out of it, and the illuminating power is reduced thereby. For this reason dry scrubbing is sometimes resorted to, or washing and scrubbing with the ammonia water derived from the gas itself. Messrs. St. John and Rockwell have devised an apparatus which takes the place of condenser, washer, and scrubber, and entirely avoids the use of any water, save that condensed from the gas. It consists of a series of compartments, by which the gas from the hydraulic main is made to bubble through the tar and ammonia water, and to pass over a lattice work of corrugated plates of iron which catch the tar globules.

I was called upon to investigate the working of this apparatus, and, with my assistants, superintended for a week, day and night, the Harlem Gas-Works, where this apparatus is now used, the results were extremely satisfactory. We used 163,120 lbs. of Penn coal, and 470,445 Murphy Run coal, about one-third Penn coal and two-thirds Murphy Run, in all 633,565 lbs., which produced over 3 million feet of gas. We found the average yield to be about 10,897 feet to the ton of coal in a week's run, and this gas being tested by the photometer, showed an illuminating power of 17·06 candles; 11,000 feet of 17-candle gas, from Murphy Run coal with an admixture of one-third of Penn, I considered a very satisfactory result. The gas is very clean. We found that it contained, after being purified with oxide of iron, only 2·65 grains of ammonia and 23·58 grains of sulphur in 100 cubic feet. Professor Würtz, in January, 1875, reported the results of his analysis of the gas before and after it passed this apparatus. The result is shown in this table. The numbers in the first two columns represent grains in 100 cubic feet.

	Crude Gas from Hydraulic Main.	Gas after Passing the Apparatus.	Per Centage of each Impurity Removed.
Water	3515	2675	23·92
Tar	515	44	91·46
Soot, dust, &c.	266	56	79·05
Naphthaline	123	25	79·77
Ammonia	339	237	30·18
Sulphuretted hydrogen	1235	1105	10·51
Carbonic acid	1698	1522	10·36

The following report of the operations of this company for the past four months, shows that this method of separating tar and ammonia water still continues to give results fully equal to those I have mentioned:—

	June.	July.	August.	September.
Murphy Run coal used, lbs. . .	2,315,500	2,372,100	2,578,800	3,108,800
Penn coal used, lbs.	92,400	..	94,200	..
Total coal used, lbs.	2,407,900	2,372,100	2,673,000	3,108,800
Gas manufactured, cubic feet .	12,049,000	12,034,000	13,298,000	15,560,000
Yield per lb.	5·01	5·07	4·97	5·01
Photometric test, candle power .	17·65	17·79	18·17	18·27

(*To be continued.*)

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Trade remains very flat and unprofitable in every branch of business, although it must certainly be admitted that, so far as pig iron is concerned, a decidedly firmer and improved state of things has been inaugurated. Foundry pig iron is in especially good request, in sympathy with the strong feeling displayed in the Scotch and Middlesbrough iron markets. Prices of several good local (that is to say Derbyshire) brands of this description have been advanced about 2s. per ton, since the 1st of January, and are very firm at the advance.

The majority of the blast furnaces are being worked, and it is thought that they will be enabled to be kept on with the greater regularity, now that the Manchester, Sheffield, and Lincolnshire Railway Company has amalgamated with the North Staffordshire. At the present time the agents here of the North Yorkshire pig iron-producing firms quote as follows for general makers brands:—No. 1 foundry, 56s.; No. 2 foundry, 54s.; No. 3 foundry, 52s. 6d.; No. 4 foundry, 51s.; No. 4 forge, grey, 51s.; No. 5 forge, mottled, 50s.; No. 6 forge white, 49s.; refined metal, 72s. 6d.; Kentledge, 60s.; and cinder pig, 40s.; all for net cash, and per ton. Good Derbyshire, No. 1 foundry, is now worth, 68s. to 69s. per ton, at the works.

The Rotherham and Sheffield brass manufacturers are not so well supplied with orders as they were up to the beginning of December; but there is still a fair average demand for ordinary plumbers and gas-fitters requisites. Hydrants, meters, plugs, fire-cocks, and other special water-works articles are being largely turned out for the home and foreign markets.

The coal trade has been very quiet indeed, owing to the depression of the iron and steel industries, and the unseasonably warm weather. Now, however, that the frost has set in, households are certain to sell more freely; otherwise the miners wages will shortly have to be lowered again.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The anxiety which has prevailed during the past few weeks, with regard to the future course of prices in the coal trade, was allayed on Thursday last by the announcement, that at a meeting of the coalowners, held in Birmingham, it has been unanimously resolved, that the present time was inopportune for any further advance in wages or prices. This resolution appears to have given general satisfaction, it being quite evident that the iron trade is just now very ill able to bear the additional burden, which any advance in the price of fuel would necessarily impose. By the same resolution the wages question is also practically settled, as under their last agreement the miners are not entitled to any advance unless the price of coal be proportionately raised; and, as the miners have recently expressed their readiness to adhere to the terms of what is known as the Birmingham agreement, the prospect of any attempt to enforce their claims appears to be remote. It is, moreover, pretty generally understood that, should the men be tempted to adopt so ill-advised a measure, the masters are prepared to offer a very stout resistance.

The demand for coal continues moderately active, at several of the collieries in the Dudley district, where important railway contracts are in course of execution. The deliveries of fuel are not quite up to the required standard. In the Cannock Chase district also the demand for best household qualities is well sustained, but at the collieries more immediately dependent upon the iron-works the demand is unsatisfactory; prices are, however, tolerably firm at late rates.

The iron market is still very flat, but few orders have been booked since the holidays, and at many of the works operations have not yet been resumed.

The new quarter has opened rather unpropitiously, and the general prospects of business are far from cheering. Prices are moderately steady at late quotations, with the exception of best sheets, which are £1 per ton lower. South Staffordshire pig is a shade firmer at £3 5s. to £4 10s., according to quality, notwithstanding the large importation of iron from other centres of production. Coke is in abundant supply, and is very slow of sale.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Now that the holidays are over, business is becoming more settled, and with a sudden change for severe weather an improvement in the house coal trade may be expected, as during the past two or three weeks orders have to a considerable extent been held back. Stocks, however, have been too low to permit of this having any material effect upon prices, except that the advance at the commencement of this year, which was talked about in some quarters, has not been found practicable, and the general quotations for house coal remain without change.

For gas-making coal there is a continued steady demand, and although supplies are tolerably plentiful, late rates are maintained.

In other classes of fuel the market displays no activity, and it is only the better classes of burgy that find anything like a ready sale; common sorts are difficult to move, and slack is a drug, with a weakening tendency in prices, reductions having been necessary in some quarters to meet the competition now existing for orders.

Coke also continues a drug in the market, and both in the Manchester and Wigan districts makers have been compelled to put out a large number of ovens in consequence of the exceedingly limited demand.

In the shipping trade a moderate amount of business is being done, with tole-

rably fair prices now ruling, the stoppage of Mr. Johnson, who had been cutting down the Liverpool market by forcing sales at below cost price, having brought about a rather healthier tone.

Prices in the iron trade of this district, so far as the raw material is concerned, are firmer, but this is altogether stopping even what little buying was going on, consumers expecting that with trade in its present depressed condition the advances cannot last. No. 3 Middlesbrough foundry iron, delivered into this district, is quoted at 61s. 3d. per ton; No. 4 foundry, 60s. 3d.; and No. 4 forge, 59s. 9d. per ton. Lancashire brands are firm at the prices last quoted. In manufactured iron the recent advances are scarcely maintained, Staffordshire and Sheffield iron, delivered in this district, being obtainable at £8 per ton, Lancashire at £7 17s. 6d., and Middlesbrough at £8 15s. per ton.

Works are only moderately employed, and there is not much on the books for forward delivery, and makers, indeed, prefer waiting until after the quarterly meetings, before entering into many new engagements.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

There is an abundance of ready tonnage in the Tyne and adjacent rivers, and coasting rates for steamers are decidedly lower; in fact, all the orders which were in the market have been taken up. An active business has been done in the shipment of gas coals from the Tyne. A considerable business was done at the Tyne Dock; and the most conclusive evidence of an active demand for the best qualities of gas coals is shown by the length of the turns, which are from eight to ten days. The demand for second-class gas coals is not so firm as for best; but it is very fair. Prices are, off and on, about the same as they hav been for a couple of months past. Collieries that have a leading position in the market command good rates; but for the rest, and they are the bulk of the pits in the trade, prices are pretty much a matter of bargain. The price of second-class gas coals will range from 8s. to 8s. 6d. per ton. The price of household coals is pretty steady. A fair rate is paid for the best quality of steam coals; but all classes of coals outside of these are pretty much in the same condition as the second-hand gas collieries. The quotations are very varied, and this condition of things is likely to prevail until there is a considerable improvement in the iron trade in the North of England. The second-class coals that are in the market are quite in excess of the demand. They have to be pushed off at the shipping places by various expedients, and they will keep second-class gas coals low during the early months of the year, at any rate.

The iron trade of the North of England has opened the year with more firmness. No. 3 Cleveland pig is quoted at 52s. 6d. per ton. But some of the makers have declined to sell at that figure, and it is expected that there will be an advance this week. There is an improvement to note in the finished iron trade also. Some of the Middlesbrough factories which were temporarily closed, are about to be reopened. There is an improvement in the coke trade, and better prices are obtained. There are likely to be good shipments to Spain this month. The prospects of the general manufacturing trade of the North of England look more hopeful. The shipments of chemicals to America are improving, and though there is no advance in price, the tone of the trade is more confident.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The transfer of the Inverness Gas and Water-Works was completed on the 31st ult., and the works are now in the hands of the Police Commissioners of the town. A long controversy has thus been brought to a final termination, to the satisfaction apparently of both parties. The gas has certainly been no worse in quality since the transferance took place, and it is confidently expected that before long there will be an improvement in the supply of water. At last term the price of the gas was reduced from 9s. 2d. to 8s. 4d. per 1000 cubic feet, but hereafter it cannot exceed 7s. 6d. per 1000 feet. The illuminating power may, however, be reduced below what it is at present—namely, 25 standard candles.

At the last meeting of the Town Council of Ardrossan it was resolved to accept the offer made by the gas company to light, clean, and supply the town lamps with gas for the sum of 14s. each per annum.

A somewhat singular accident occurred at the gas-works, of Port Glasgow early on Thursday. Workmen are at present engaged in the construction of a new gasholder, the excavation for which was on a lower level than that of the gasholder at present in use, and which is placed immediately alongside. The pressure from the old gasholder caused the bottom of the tank to give way, and the water was forced into the new excavation. It was feared that the community would be left in darkness on Thursday night, but the officials were equal to the emergency.

A Greenock correspondent says that the new gas-works of that town, which have been in operation for nearly three years, now present a very finished and complete appearance, and continue to give every satisfaction. Additional benches of retorts have been built, which will doubtless be sufficient to meet all demands for gas for some years to come, as also various sheds, and other necessary accommodation to suit the requirements of the manufacture. The demand for gas is steadily increasing, although, of course, it is affected by the present unfortunate dulness of trade; but the consumption of gas last year, notwithstanding the dull trade, was quite up to the mark, and, as soon as trade revives, a large additional consumption may be expected. A portion of the ground occupied by the old works has been retained, and new offices have been built upon it in Crawford Street, thus giving additional facilities for conducting the business in the town.

The monthly meeting of the Dundee Gas Commission was held on Wednesday, when it was reported that the amount of coal carbonized during December was 3538 tons 14 cwts., and the amount of gas made was 38,324,800 cubic feet. The illuminating power of the gas was tested nine times during December, and the average result was 28·74 candles. At the same meeting it was mentioned that Mr. M'Crae, the manager of the gas-works, had prepared a paper on the economical use of gas, which he was willing to read in public, and to illustrate it with experiments. The notion was highly approved of.

Some progress is being made on the water question at Keith. Two meetings have been held by the committee appointed to deliberate upon and fix the boundaries of the water supply district. At the second meeting, Mr. Willett, C.E., submitted a sketch of the proposed boundaries, and gave an outline as to the probable expense. Before coming to any definite conclusion on the matter, the committee resolved to hold another meeting, and make a tour of investigation round the town, and fix the lines, after examining every part of the ground.

In consequence of the scarcity of water in the town of Hawick, notice was given last Tuesday, at a meeting of the Town Council, of a motion to increase the supply by laying a new water track.

Sir John Hawkshaw concluded his inquiry a few days ago regarding the purification of the Clyde, so far as the taking of evidence is concerned, by the examination, in London, of Sir Joseph Bazalgette, engineer of the Metropolitan Board of Works, and Mr. William Crookes, F.R.S., editor of the *Chemical News*, who was formerly connected professionally with the "A. B. C." sewage treatment process.

The pig iron warrant market has fluctuated a little during the past week, but prices were generally well maintained. The opening price on Friday forenoon was 64s. 3d. cash, but it rapidly improved to 64s. 7½d. prompt, and from 64s. 6d. one month, to 64s. 10½d. was also paid, closing with buyers at the highest price, sellers asking 1½d. per ton more. In the afternoon the market was strong, and a large amount of business was done, buyers 65s. one month open, sellers 65s. cash.

Irregularity has been the rule in the coal market during the holidays. The forward demand was not so good at the end of the past week, especially for house descriptions of coal, owing to the mild weather. Prices are consequently easier. The quotations on Friday were—Wishaw Main coal, 7s. 9d. to 8s. 6d. per ton; house coal, 9s. to 11s. 6d.; splint coal, 8s. 6d. to 9s. 3d.; steam coal, 9s. to 11s.; smithy coal, 14s.

STOCKTON CORPORATION GAS SUPPLY.—The Gas Committee of the Corporation of Stockton have recommended to the Town Council to borrow the sum of £10,000 for improvements and extensions of the gas-works; they have also accepted a tender by Messrs. Ashmore and While for the construction of a new gasholder-tank.

DEATH OF MR. SOTHERON ESTCOURT.—The daily papers of Friday last announced the death, on the previous day, of the Right Hon. T. S. Sotheron Estcourt, who in 1859 was appointed Home Secretary, under Lord Derby's administration. The right honourable gentleman is remembered in the gas world for the courtesy and ability he displayed as chairman of the select committee of the House of Commons, during their protracted sittings on the Metropolis Gas Bill, 1860. He retired from public life in March, 1865, owing to failing health. He was in the 75th year of his age.

SEWERAGE OF IPSWICH.—At a meeting of the Ipswich Town Council, on the 22nd ult., it was resolved, on a motion by Mr. E. R. Turner, that Mr. Bruff, C.E., should be instructed to prepare plans and specifications for the sewerage of the town on the north side of the Orwell, in accordance with his report of September 18, 1875, the plans to include the provision of means for arresting suspended matter at the outfall, and dealing with the storm water, to be so arranged as to admit at any time of additional works for the more elaborate treatment of the sewage, if found necessary.

AVERAGE METER SYSTEM AT WEST DERBY.—At the meeting of the local board of this district, on the 4th inst., the works sub-committee reported that they had considered the expediency of introducing the average meter system to the public lamps, and they recommended its adoption. By means of this system, the committee stated in their report, the quantity of gas consumed, and consequently the cost, would be much less than at present, and the illuminating power of the gas would remain equal to its present power, or, at any rate, sufficient for the requirements of the district.—The recommendation was adopted.

CHAPELTOWN WATER SUPPLY.—The board of guardians for this district have just entered into an arrangement with the Sheffield Water-Works Company for a supply of water. The water company are to supply 70,000 gallons per day, through a low-pressure meter, at a cost of 7½d. per 1000 gallons; the board are to undertake the providing of a tank at Potter Hill for the reception of the water, and also the distributing of the water throughout the district. To meet the necessary outlay, the board propose to borrow the sum of £5000 from the Public Works Loan Commissioners at 3½ per cent., repayable in 30 years.

DRAINAGE OF THE THAMES VALLEY.—The summons brought against the Hampton Wick Local Board by the Thames Conservators to recover penalties to the amount of £94,700 for neglecting to divert the sewage of the parish from the Thames, was fixed for hearing at the Staines Petty Sessions on Tuesday last, having been adjourned to that date in order to give the board an opportunity of sending a deputation to the Thames Conservators. A letter was, however, handed to the magistrates stating that the Conservators had agreed to suspend the proceedings for six months, and the summons was withdrawn without prejudice, it being understood that the Conservators were to have the opportunity of taking out a fresh summons at the end of that time if they wished.

PURCHASE OF THE ST. HELEN'S (LANCS) GAS-WORKS BY THE TOWN COUNCIL.—At the meeting of the St. Helen's Corporation on Wednesday last, the mayor (Mr. J. Radley) stated that at a meeting of the shareholders and directors of the gas company that day, it had been unanimously decided to accept the offer of the corporation to purchase the works for £131,600. The council was then asked to confirm what the committee appointed by them had done in carrying out the negotiations. The terms of the purchase required that it should be completed by the 1st of July of the present year, when the company would give up possession, the corporation to pay the purchase-money, with 4½ per cent. interest from the 1st of September last to the date of completion. The agreement was adopted. The capital of the company, as fixed by their last Act, consists of 4600 £10 shares (paid up) and 1200 £10 shares, upon which in 1874 £2 only had been paid. The town-clerk was instructed to apply for the sanction of the Local Government Board to the purchase; to borrow the money from the Public Works Loans Commissioners, and to take the necessary steps for the completion of the purchase; a committee being also appointed to superintend the management of the works until the purchase be completed.

FATAL ACCIDENT TO THE SECRETARY OF "THE NEW GAS COMPANY."—Mr. Henry Brownrigg, of No. 9, Devonport Road, Shepherd's Bush, secretary to "The New Gas Company," met with a fatal accident on the Great Western Railway on the afternoon of Monday, the 3rd inst. The company have been for some time carrying on experiments at the West London Junction Gas-Works, adjoining the line; and it would appear that, on the day above mentioned, Mr. Brownrigg left the works about 4.45, and proceeded along the line of railway near the North Pole Junction, and that, in trying to avoid a North-Western train, he was knocked down by a Great Western train on the road to Victoria. The near side buffer struck him, and the whole of the wheels passed over his head, causing instantaneous death. His body was removed to the Pavilion Hotel, Wormwood Scrubs, to await the coroner's inquest, which was held on the 5th inst. The evidence went to show that the deceased and other gentlemen connected with the company were in the habit of crossing the line at that spot for the purpose of getting into the works, owing to the dirty state of the roads in the neighbourhood. On Monday afternoon the deceased was found lying dead in the six-foot way, fearfully mutilated. An examination of an engine which had recently passed, left no doubt that the deceased was knocked down and killed by it. The jury returned a verdict of "Accidental death." The deceased was 71 years of age.

ACCIDENT AT THE PUDSEY GAS-WORKS.—On Tuesday evening last, shortly before seven o'clock, an accident occurred at the Pudsey Gas-Works, which, in itself sufficiently serious, might have been attended with more dangerous consequences. At the time named, one of the end walls of the retort-house, a building about 66 feet long by 45 feet broad, which was in course of being repaired, suddenly gave way, and came down with a crash upon the top of the retort-bed and the men who were working below. The time was a rather unfortunate one, as the day and night shifts were just being changed, and there were more men than usual—some eight or nine—in the building. The roof was supported by a number of wrought-iron girders, on which were laid grey slates of considerable weight. The greater portion of these fell on to the top of the retort-bed, but a quantity of the *débris* came down amongst the men who were below. Most of them escaped without any serious injury, but three or four were struck by the falling slates. The result of the accident was to cause some inconvenience to the public, as the production of gas was stopped for the evening, and the greater portion of the district supplied by the company was in darkness from seven o'clock, as well in the private houses as in the public highways. At the Stanningley railway station the officials obtained a supply of carriage lamps from Leeds, with which they lighted the station and its approaches. As quickly as possible the *débris* was cleared away from the retorts, and some of them were got to work.

NEW GAS AND WATER COMPANIES.—*Emsworth Gas and Coke:* This is the incorporation of a company originally constituted by the provisional registration, and completly registered in 1853. It is now brought under the Companies Acts, 1862 and 1867, as a "limited company," in accordance with the resolution of a general meeting. The capital is £2000 in £10 shares. *Flamborough Water-Works:* This company has been registered for the purpose of erecting water-works at Flamborough, in the East Riding of Yorkshire. The capital is £4000 in £5 shares. *Harrison and Company:* This company has been formed to acquire the rights and interests of Messrs. C. W. Harrison, A. H. Harrison, A. Douglas, H. Hodgson, jun., and R. Carr, in any patents or licenses for the manufacture of air gas and machines and appliances held by them. It has been registered with a capital of £3000 in £5 shares. The purchase consideration is £2400 in fully-paid shares. *Leatherhead District Water-Works:* This company has been formed for constructing works to supply water to Leatherhead, Stoke D'Abernon, Chessington, Malden, Ashtead, Headley, Mickleham, Fletcham, Great Bookham, Little Bookham, Dorking, Betchworth, Wolton, Leigh, Capel, Pattersham, and West Humble, Surrey. It has been registered with a capital of £5000 in £5 shares. *Rugby Gaslight and Coke:* This is a reconstruction of the Rugby Gas and Coke Company. The old company was first constituted by deed of settlement in 1838, and was brought under the Acts of 1862 and 1867 as a limited company in October last. The new company has been registered to expend further capital, and to extend the present works and mains. The capital is £50,000, divided into 2500 shares of £10 each, called original shares, to be considered as fully paid, and 2500 shares of £10 each, to be called new shares.

HULL GAS SUPPLY.—Below are the results of an examination of the gas sent into the district of Sculcoates and Myton by the British Gas Company during December; also the mean of means for the past half year, during which period 74 examinations were made for illuminating power, and 22 quantitative analyses in respect of chemical purity. At no time was free ammonia or sulphuretted hydrogen present to the ordinary tests:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	17·78	15·96	16·60
Six months	16·67	15·13	16·10
Grains of sulphur per 100 feet	28·50	27·00	27·70
Six months	27·81	25·75	26·58
Grains of ammonia per 100 feet	—	—	·89
Six months	·80	·60	·70

Mean barometer and temperature in experiment-room:—Bar., 30·15; tem., 56°. —JAMES BAYNES.—*East District:* During December the gas sent into this district by the Sutton, Southcoates, and Drypool Gas Company yielded as follows—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·91	15·89	16·52
Grains of sulphur per 100 feet	—	—	5·85

Mean barometer and temperature in experiment-room:—Bar., 30·12; tem., 53°. The results for the year 1875 are—

	Max.	Min.	Mean.
Illuminating power	17·15	15·44	16·24
Grains of sulphur per 100 feet	16·48	4·75	8·84

The illuminating power during the year has been good, whilst the sulphur compounds are now about the lowest in the kingdom. When the new scrubber is erected, which will remove the ammoniacal impurities, the gas will be of very good quality throughout.—JAS BAYNES, Jun. The burner used for testing is in both districts Sugg's 15-hole elliptical.

SHEFFIELD WATER SUPPLY.—The 31st ult., being the last day allowed by the Water-Works Company's Acts of Parliament for the construction of the various dams in the Loxley Valley, the great Damflask reservoir was finished, and the valves leading from it shut down. This fine piece of engineering, in common with all the more modern of the company's undertakings of the same description, has been designed by Mr. T. Hawksley, C.E., the company's engineer-in-chief, and has been constructed by Mr. David Craven, the company's contractor, under the constant and personal supervision of Mr. John Gunson, the resident engineer of the company. The Damflask reservoir is very considerably the largest of all the storeage places for the town's water, and is one of the largest of its kind in the United Kingdom. Its water surface when at an ordinary level will cover an area of over 125 acres, and its contents will measure up to the startling quantity of 1200 million gallons. To uphold this immense volume of water, an embankment has been constructed across the valley, in which all the best known elements of strength and safety have been combined. The embankment is, we are informed, over 1000 feet wide at its base, and 50 feet at the summit—over which a new road has been made. The old road will be closed today. The byewash will commence with a width of about 70 feet near the shuttles at the top, and gradually widen until at its base the width is 120 feet. By means of this overflow channel the depth of water in the dam can at any time be lowered several feet with the utmost expedition. The byewash is executed in Ashlar stone, and a considerable quantity of stone is "worked into" the different parts of the inner face of the embankment, the valve-pits, &c. The company have laid a 24-inch main from this reservoir to Hillsborough, for the purpose of affording means of improving the supply of the town in its lower parts. At the present the main itself practically terminates at Hillsborough, a substantial masonry erection having been placed at its extremity by way of giving ample support, at the angle near the bridge. From this point it is probable that various pipes will be made to radiate.

LEEDS (CORPORATION) GAS SUPPLY.—At the meeting of the Leeds Town Council, on Saturday, Jan. 1, the following report of the Gas Committee was presented:—"The Gas Committee beg to report that they do not deem it desirable to divide the committee into sections, the present supervision of the Visiting Committee being, in their opinion, sufficient to meet all requirements. The committee also beg to submit the following particulars, in answer to the resolution of the council:—"Year ending June 30, 1874. Cost of gas manufactured, which includes coals, purifying material, water, use of railway waggons, horse and cart hire, and wages; or, in other words, cost put into the gasholder—

At York Street works	2s. 8¼d.	per 1000 cubic feet.	
,, New Wortley works	2 6½	,,	,,
,, Meadow Lane works	2 5¾	,,	,,
Average	2s. 6¾d.	,,	,,
Cost of gas sold, including all expenses, except sinking-fund and interest	4s.	0·083d.	per 1000 cubic feet.
Less income from residuals	1	0·45	,, ,,
Net cost	2s. 11·63d.	,,	,,

Cost of collection, £1320 per annum. Number of accounts, about 60,000 = 5¼d. per account, or 0·32d. per 1000 cubic feet of gas made. Cost of service, including inlet and stop-cock, half-inch average, about 14s. per service. Cost of service, including inlet and stop-cock, 2 inches average, about £1 8s. per service. Cost of inspection of meters, £2800 per annum. Number of meters, about 63,000 = 8¾d. per meter, or 0·56d. per 1000 cubic feet of gas made. Sinking-fund, 1 per cent. on capital, being, for the present year, equal to 2·31d. per 1000 cubic feet of gas made." Mr. Scarr, in the course of a long speech, read returns from other towns in which gas of an equal illuminating quality was made, in some cases, from 6d. to 9d. cheaper per 1000 cubic feet than in Leeds. In reply to a question, Mr. Wray said that, with improved plant, better retorts, and cheaper coal, there had been a profit of £7000 on the gas during the past year, and next year, under similar conditions, he hoped the balance would be much larger.

LICHFIELD GAS SUPPLY.—At the meeting of the Lichfield Town Council on the 4th inst., the Mayor (Mr. Jno. Coxon) read a letter from Messrs. Barnes and Russell, solicitors, which stated that in consequence of the dissatisfaction of a great many of the citizens with the present supply of gas, a new company was being promoted. They were instructed by the promoters, however, to ask his Worship, in his official capacity, as head of the corporation, to convene an early meeting of the Town Council for the purpose of considering the advisability of the corporation taking into their own hands the entire management of the gas supply, and if the corporation were unwilling to do this, to determine whether the council would give permission to the proposed new company to lay pipes in the streets. His worship also read a memorial, which had been extensively signed by consumers, who, for the reason mentioned in the letter, agreed to assist in the promotion of a new company, and to take shares. Mr. Hinckley said it was very clear, from the memorial, that there was great dissatisfaction in the city with regard to the gas, but he did not think Lichfield was the place for two competing companies. The proper plan would be for the corporation to take the gas supply into their own hands, and he proposed that a committee should be formed for the purpose of conferring with the directors of the company as to the purchase of their plant. Mr. M'Lean also proposed, as a rider, that the committee be empowered to confer with the committee of the proposed new gas company. A committee was then appointed, consisting of the Mayor, Messrs. J. Gilbert, Owen, Symonds, and Trevor. Mr. Morgan, on behalf of the directors of the gas company, said, that although on a few occasions the quantity of gas had been bad, owing to some alterations which were being made at the time, they totally denied that the gas had been usually bad, and affirmed that, as a rule, it had been as good as was to be found in any town of its size. The directors had found that the inefficient light given in many cases was owing to bad fittings and meters. They could supply any quantity of gas that might be required. With regard to the proposition that the corporation should take the management of the supply into their hands, he had to say that the directors were perfectly willing that they should do so if they could manage it better, and were willing to confer with the council to hand their works over on an equitable valuation. Mr. Owen replied to these remarks, and denied that there was a sufficient supply of gas. He said that during the last three months the quality had been very bad, it had been simply sewage gas, and smelt dreadfully. Other members also complained of the quality and quantity of gas supplied, and after a short discussion Mr. Hinckley's motion was carried. A letter was read from the managers of the gas company, announcing that the price of the gas, as by a resolution passed six months ago, had been reduced 6d. per 1000 feet.

SILICATE COTTON.—The utilization of blast-furnace slag has, for many years past, occupied the attention alike of ironmasters and inventors; but, although this waste product has to some extent been applied to economic purposes, the enormous slag deposits in the iron districts still continue, for the most part, to increase. Processes for converting this refractory material into sand, and subsequently into bricks, mortar, concrete, and cement, are being employed on a practical scale both in England and on the Continent. In Belgium it is likewise used in the manufacture of glass, contracts being entered into with the proprietors of blast-furnaces for a regular supply. Another more recent and more singular application of this dense and brittle substance is that of a clothing for steam-boilers and steam-pipes, in order to prevent radiation and consequent loss of heat. To produce the slag in a proper condition for this purpose, a blast of steam, water, or air is forced into the stream of viscous slag as it is run from the furnace. This peculiar treatment imparts to the slag a finely divided character, and it assumes a fibrous form and appearance, somewhat similar to that of spun glass. This fibrous slag is a bad conductor of heat, and has been used with success on the Continent, for several years past, for the purposes last indicated, being there known as "furnace wool." Herr Krupp, of Essen, long since directed his attention to its production, and for the last three years the boilers and steam-pipes at his extensive steel-works have been clothed with this substance, to which he has given the name of "silicate cotton." Herr Krupp has also supplied this material to some of the largest manufacturing establishments in Europe, where it has been adopted with perfectly satisfactory results. Having thus successfully applied it, and having found it to be a very convenient way for utilizing the slag from his blast-furnaces, Herr Krupp has now arranged for its introduction into England, through Messrs. Cresswell and Co., of 138, Leadenhall Street. The special features of the silicate cotton are stated by Herr Krupp to be perfect incombustibility, even in immediate contact with fire, combined with comparative indestructibility, inasmuch as it is neither affected by damp, hot or cold water, acids, or any chemical ingredients, to which it stands in about the same relative position as glass. It therefore presents several advantages over the ordinary boiler coatings, and is besides capable of extensive application in the arts and manufactures. It is very light, a ton covering 560 square feet, even when it is applied 2½ inches thick, and, being of a woolly nature, it at once discloses a leak in steam-boilers. Being a perfect insulator of both heat and cold, its application to fire-proof structures, refrigerating apparatus, and the like, at once suggests itself. In short, this new introduction promises to subserve many useful purposes. This material, inasmuch as it is perfectly insoluble, is likely to be well adapted for caulking water-mains, in place of hemp or tow, which quickly decays, and communicates impurities to the water.

Register of New Patents.

219.—EKSTRÖM, A. H. A., Hamburg, "*Improvements in apparatus for bringing centrifugal pumps into action.*" Provisional protection only obtained. Dated Jan. 20, 1875.

This invention consists in arrangements of mechanism by which the pressure of air in the delivery and suction pipes of centrifugal pumps, which hinders the rising of the water, is removed by a jet of steam.

227.—BLAKEBOROUGH, R., Brighouse, and BECK, J., Pemberton Row, London, "*Improvements in hydrants and fire-cocks.*" Patent dated Jan. 21, 1875.

This invention consists in the combination of two distinct valves in a hydrant, the one valve being used in the ordinary manner and for the usual purpose, whilst the additional valve is employed solely for shutting off the hydrant from the main in case of repairs, by which arrangement the rest of the hydrants attached to the main are left in free operation, and the necessity for emptying the main is obviated. The improvements in fire-cocks have for their object greater compactness by dispensing with the ordinary projecting branches, and consist in casting a hollow belt round the supply-pipe, and making the valve-seat directly on the surface of the pipe itself, inside the said hollow belt, a short exit nozzle being fitted to the outside of such belt.

261.—COLEBROOK, C. T., Islington, "*Improved means or apparatus for raising water from wells or other places, or for raising other liquids.*" Patent dated Jan. 23, 1875.

To carry this invention into effect any suitable number of chambers or compartments are employed, which are placed at suitable distances apart. These chambers are attached to a main-pipe, which leads to the liquid to be raised, and in each of these chambers a retaining valve is so arranged as to allow the liquid to rise, but prevent it from returning, and leading from each of the chambers. There is also arranged and connected an air-pipe, which pipes are connected alternately to one or the other of two main air-pipes leading to or from an apparatus capable of producing alternately a partial vacuum and a pressure. If,

for example, six chambers be used, then, upon producing a partial vacuum, the chambers Nos. 1, 3, and 5 are affected thereby, and the liquid will rise, firstly into chamber No. 1, and then, upon producing the pressure, the air that was drawn out from Nos. 1, 3, and 5 is pressed back to them again, and at the same time a partial vacuum is being formed in Nos. 2, 4, and 6, and the liquid will not rise into chamber No. 2, and by similar repetition the liquid will continually rise into the next higher compartments, until it reaches the top, whence it may be conducted as required.

265.—MILLS, E. C., and HALEY, H., Gorton, Lancaster, "*Improvements applicable to motive-power engines worked by the explosion of gas.*" Patent dated Jan. 23, 1875.

This invention relates to those motive-power engines in which a cylinder and piston are employed, on each, or on one side of the latter of which gas is periodically exploded to force it forward, and consists in providing a cushion of air or other elastic abutment to receive the force of the said explosion, and through which the motive force is exerted. In the arrangement proposed the rod of the piston is connected to another piston within a cylinder, which forces forward air against pressure, by means of which a storeage of motive force is effected within a suitable receiver to be used in any ordinary manner; or the said air may be forced as a direct blast, or used in any other manner in which air under pressure is required. By simply reversing this arrangement the same result may be obtained by exhaust.

268.—GILL, D., Weston-super-Mare, "*An improved method for neutralizing the poisonous and offensive nature of sewer or drain gas, and to deodorize the sewage.*" Patent dated Jan. 23, 1875.

This invention consists of a vessel made of fire-clay, or other suitable material for generating the desired gas or vapour for fumigation, with heating chamber under; an inlet-pipe to admit air to drive fumes from the generating vessel forward into drain; an exit-pipe from the said vessel for conveying fumes into drain; and a pipe or upshaft placed at the most suitable position to the drain, carried up to a suitable height; this shaft is to create a current to draw the fumes down into the drain and through it. This invention can be used to flush drains with fresh air without fumes. The principle of this invention is also applicable on a larger scale to public drainage, and may be extended over large areas by means of stations. The compound for chlorine gas has been found suitable, but other fumous disinfectants may be used by this method.

269.—ALLEN, W., Manchester, "*Improvements in machinery for raising and forcing fluids and liquids.*" Patent dated Jan. 23, 1875.

The pump, constructed according to this invention, consists of a plunger which works in a cylinder, the upper part of which is closed by a gland with a double seating. The ingress and egress valves are connected by side passages to the upper and lower ends of the cylinder, and the upper passage passes through the gland between the two seatings. The hole in the gland must be wider than the passage, to allow for the tightening up of the gland.

272.—POTTS, J. C., Handsworth, and DARNELL, D. C. W., Edinburgh, "*Improvements in apparatus for ventilating water-closets, lavatories, bath-rooms, sinks, and other structures and appliances connected with sewers.*" Patent dated Jan. 23, 1875.

The object of this invention is to ventilate water-closets and other structures in such a manner that sewer gas is excluded therefrom, and the sewer gas delivered into the atmosphere at a point where it cannot gain access to the building, and any exhaustion or diminution of pressure in the closet soil-pipe, or other pipe communicating with the external drain, made to result in a current of fresh air from the atmosphere passing into the building. The soil-pipe of the water-closet, sink, or bath opens into a funnel-shaped chamber, the top of which is open, and is on or above the level of the ground. The bottom of this chamber terminates in an ordinary water-trap. Near the part of the soil-pipe fixed into the sewer is a vertical pipe or air-shaft, rising to the top of the building.

286.—CORY, E., Cardiff, "*Improvements in motive-power engines, also applicable to pumps or measures for air, gases, or liquids.*" Patent dated Jan. 25, 1875.

This invention mainly consists of two or more revolving pistons working in a casing or cylinder, and actuated by eccentric wheels or gearing, which, at certain parts of the revolution, and while passing the steam inlet or port, cause the area of the relative leading piston, upon which the steam acts, to travel faster than the area of the piston immediately following, upon which the steam presses with equal force. The steam thus acts upon the area of the relative leading and following pistons with equal pressure, and, by the difference of leverage from the eccentric gearing, the pistons are compelled to revolve in continuous rotation. A reverse action takes place upon the area of the pistons while passing the exhaust port or steam outlet. The invention can be applied as a water-power engine, and, if driven from the exterior, will act as a pump or exhauster for air, gases, or liquids, and, with the addition of an index to register the number of revolutions, it may also be applied as a meter or measurer of gases or liquids.

294.—CANNON, W. G., London Road, Southwark, "*An improved cup-and-ball joint for gas pendants and chandeliers.*" Patent dated Jan. 26, 1875.

This invention consists in an arrangement at the bottom of the cup—viz., a box to contain a vulcanite or leather ring or washer, held in by a cap screwed to the cup, the ring or washer being large enough to allow the tail-piece or suspending rod to pass through freely, but smaller than the hole in the bottom part of the cup; thus, when the pendant is swinging to and fro, the tail-piece or suspending rod will strike against the ring or washer instead of the cup, as is the case with the ordinary cup and ball, and so make it impossible for the tail-piece or suspending rod to come in contact with the cup and bruise it, thus preventing the escape of gas which must occur where a cup and ball is bruised, and which is so often the cause of explosions.

321.—TAYLOR, R., Oldham, "*Improvements in machinery for tapping screw threads.*" Patent dated Jan. 28, 1875.

In this apparatus the spindle to which the tap is secured is turned round alternately in opposite directions by a driving strap and three pulleys, one of which is fixed to the spindle, and the others provided with internal teeth gearing into a carrier pinion which drives the spindle. The strap is moved to and fro over the pulleys by a self-acting apparatus actuated by the slide.

323.—DAVEY, H., Leeds, "*Improvements in pumping apparatus worked by hydraulic pressure.*" Patent dated Jan. 28, 1875.

This invention relates to deep-sunk pumping apparatus worked by hydraulic pressure instead of rods or rigid connexions. One form of the apparatus, suited for use in sinking shafts, consists of a cylinder fitted with a differential hollow plunger, worked by water under a higher pressure than that of the delivery, means being arranged of easily raising the working parts for repair. In another form, two pumps are combined with one intermediate quadruple valve box, their hollow plungers being connected together and worked by pressure exceeding that of the delivery, the valves being alternated in their action by a small slide controlled by cataract action. Such pumps may be placed at the bottom of a shaft to supply a set of pumps at a higher level, the lower pumps being worked by water from the delivery of the higher.

326.—WEARE, R., and ISHERWOOD, S., Manchester, "*An improved carbonaceous material, suitable for filtering, deodorizing, and other analogous purposes, and in the apparatus employed in its manufacture.*" Patent dated Jan. 28, 1875.

The features of novelty in this invention consist in the production of an improved carbonaceous material by mixing clay with sawdust, clinkers, and refuse from furnaces, together with tanners waste or the nuts used by tanners, and charring the mixture in an apparatus consisting of three, five, seven, or more cylinders revolving in or over a furnace, and arranged in the case, say of three, with two small upper cylinders and one large lower cylinder. The material is fed into the top cylinder, and after being partially carbonized, passes through suitable hoppers to the lower one, all the extremities of the cylinders being fitted with covers to obtain ready access to the interior.

360.—LAMBERT, C., Hull, "*Improvements in filters, or apparatus intended chiefly to clear rain water during its flow from roofs to reservoirs.*" Patent dated Jan. 30, 1875.

This apparatus consists of an outer casing attached to the wall of the building, within which is an inner vessel into which the water is led. The upper part of the inner casing has holes through which the water passes into a filtering medium, held between perforated plates, through which it passes to a reservoir.

373.—SCOTT, H. Y. D., Ealing, "*Improvements in the manufacture of manures.*" Patent dated Feb. 1, 1875.

The object of this invention is the production from fœcal matters of manures sufficiently concentrated to command a ready market without the creation of a nuisance in the process. Instead of employing deodorants of a bulky and (as respects fertilizing properties) inert nature, use, in some of the closets, is made of coal soot, which contains considerable quantities of ammoniacal salts, and in others a deodorant lime, which is subsequently neutralized with phosphoric acid, is applied in a soluble form combined or uncombined with a base. The combined matters are afterwards stirred in a pug mill, then dried and reduced to a powder.

378.—BUCKLEY, J. B., and STOCK, E., Oldham, "*Improved double and single sealing stench-traps.*" Provisional protection only obtained. Dated Feb. 2, 1875.

These traps are intended to be used for slop stones, streets, washing basins, baths, &c.; the outer forms of the traps, and the positions of the pipes or passages, through which the liquids or sewage pass, being arranged according to the various requirements.

In one arrangement the trap consists of an outer vessel having three partitions, two extending from the top to about three-fourths of the depth of the vessel, and the last extending from the bottom to about one-half the depth of the vessel, there being an inlet to the outer vessel, a cover over the two partitions, and an outlet from the last partition to the outside of the vessel. The liquid or sewage passes into the outer vessel, and rises about midway, extends about one-fourth above the bottoms of the two partitions, and runs off over the top of the last partition; and, as there are three partitions containing the liquid or sewage, there is a double seal, which effectually prevents the escape of any noxious smell or poisonous gases.

The single trap consists of an outer vessel having two partitions, one extending from the top to about three-fourths of the depth of the vessel, and the other extending from the bottom to about midway, there being a perforated lid for the admission of the liquid or sewage, and at the bottom, outside the second partition, an opening for its escape; and as the liquid or sewage rises above the bottom of the first partition, and runs off over the top of the second partition, a trap, having a single seal, is effectually obtained.

396.—ATHERTON, J., Euston Road, London, "*Improvements in joints or couplings for uniting pipes or tubes, and for securing tubes in condenser and other plates.*" Patent dated Feb. 3, 1875.

These joints are made so that they may be easily connected or disconnected, and are perfectly sound at any ordinary pressure, without the use of white lead or other cement, or brazing or soldering.

A hollow cylinder or shell of brass, iron, wood, or other suitable material, is constructed, which may be circular or of other form, with belts cast thereon to give additional strength. The ends of the cylinder are bevelled or inclined inward towards the pipe, so as to contract the opening for the insertion of the pipe, and so form recesses into which are forced annular conical india-rubber rings or other similar packings which may have any desired angle. These rings or packings are so formed that when internal pressure is applied they press against the contracted ends of the cylinder, and so form a compact and sound joint. Within the cylinder projections or webs are provided to give rigidity to the tube or pipe; but these webs are dispensed with when it is desired to give elasticity to the joint.

The method of using the joint is first to introduce the india-rubber or other packing into the hollow cylinder. The end of the tube or pipe to be coupled is then forced therein.

In a modification, the india-rubber rings or packings are so made as to withstand external and internal pressure; for this purpose a metal gland is screwed into a plate pressing tightly against the packing, thus forming a sound and durable joint with the pipe; or the joint may be made without the gland by having a plate recessed to receive the conical packing, or two plates so secured together as to form cones for the packing to abut against.

It is further modified by making the joint or coupling with one end flanged, the other parts being similar in all respects to that first described. Or it is constructed with one end screwed for connecting with an ordinary gas-pipe socket. This joint is particularly adapted for making connexions with the ordinary iron barrel used in gas and hydraulic fittings; it may be made to form reducing sockets.

In another modification cylindrical rings of peculiar shape are formed of brass, iron, or other suitable material with flanges cast thereon, whereby they are firmly secured together by ordinary screw bolts and nuts after being placed on the tube or pipe. The rings have splayed or bevelled edges to receive the packings or india-rubber rings which are interposed between the two cylindrical rings, and abut against their splayed or bevelled edges. In this form the pipes or tubes to be united have external flanges.

The method of applying this joint is to slip one cylindrical ring over the pipe, the flange is then formed on the end of the said pipe, the india-rubber or other packing being placed thereon, when the pipe or tube is ready for connexion by the bolts in the usual manner.

Instead of making the india-rubber or other packing conical, it may, in some instances, be made circular, rectangular, or of any other suitable form.

399.—RYDILL, G., Chancery Lane, London, "*Improvements in the process of and apparatus for treating and purifying sewage and polluted waters, which improvements are applicable for collecting the soap, grease, and oils for the manufacture of gas and for removing incrustation in steam-boilers.*" Patent dated Feb. 3, 1875.

This invention consists, first, in forcing air by means of a fan or blowing engine through filtered water to supply oxygen to the decomposed organic matter through pierced or perforated pipes fixed under water, which may be connected to an air vessel; secondly, in collecting the soap, grease, and oil on a filter for the manufacture of gas; thirdly, in precipitating the heavy impurities in sewage, dye, and polluted waters with caustic soda or clear lime water, used either singly or combined, removing incrustation in steam boilers, purifying waters, after which the same may be filtered; fourthly, in forcing air through lime water, caustic soda, or sulphuric acid water for the purpose of purification of water and precipitation; and fifthly, in forcing the heated products of combustion, as described, through pierced pipes into polluted waters, as well as air passed over heated charcoal.

400.—JOHNSON, R., Bradford, "*Improvements in machinery for obtaining motive power for raising, forcing, and exhausting fluids and liquids, and for measuring liquids.*" Patent dated Feb. 3, 1875.

This improved machine consists of an external cylindrical casing with inlet and

outlet passages, and of an internal cylinder, through which a sliding piston passes; the spindle of the internal cylinder transmits the motion obtained when the machine is used as a motor, or the motion to the internal cylinder when the machine is used for other purposes.

417.—CHAMBEROT, E. A., Paris, "*Improvements in cocks for water, steam, air, or gases.*" Patent dated Feb. 4, 1875.
This invention has for its object improvements in the construction of cocks in order to prevent the shock or recoil which is generally produced in water-pipes at the time of closing the cocks. The several improved arrangements of which it consists are all based on the principle of the slow closing of a movable valve whatever be the pressure of water in the supply-pipe, and notwithstanding the act of the person drawing the water. (The various arrangements proposed are not described apart from the drawings.)

425.—CROMBIE, E. E., Diana Place, Euston Road, London, "*Improvements in dry gas-meters.*" Patent dated Feb. 4, 1875.
The object of this invention is to reduce the friction of dry gas-meters to a minimum, and to do away with the intricate gas passages under the valve-plate, at the same time giving the capability of working at a lower pressure than hitherto, and obtaining a larger and steadier flow of gas throughout than from any other meter in existence of an equal size.

This meter is constructed in the following manner:—The lower part of the meter is as usual divided by a vertical partition into two separate measuring compartments, within each of which is contained a flexible bag or diaphragm carried by the central partition. At the top of the meter is a horizontal closed compartment, into which the gas passes from the measuring compartment before it passes to the burners. Within this horizontal compartment are two valves which may be termed irregular oblongs. Each valve is arranged to pivot upon a pin at one end, and its opposite end works over two ports, one passing to the interior of one of the diaphragms, and the other to the chamber in which the diaphragm is contained. Gas passes at all times into the interior of the valves through a port near to that end upon which the valve pivots, while the outer end of the valve is caused alternately to cover over first one and then the other of the two ports leading to the inside and outside of the diaphragms respectively. When it covers the port leading to the diaphragm, gas is supplied to the interior of the diaphragm, whilst the port leading from the exterior chamber remains uncovered, permitting gas to pass freely from it to the upper chamber of the meter, and thence to the burners. When the valve covers the port leading to the chamber containing the diaphragm, the action is reversed.

The two pivoted valves both receive motion from a shaft contained within the upper chamber, and this shaft receives a revolving motion from the alternate collapsing and expanding of the measuring diaphragms in the ordinary well-known manner.

All the intricate passages or gas ways under the valve-plate are done away with completely, there being only a simple passage leading from the inner port hole of each valve to the inside of each diaphragm, thus doing away with the stoppage of the flow of gas caused by the many sharp turns in the passages now in use. The friction of this meter is reduced by having each valve working on a pivot at the round end and placed close to the cover, thus dispensing with nearly one half the usual pressure to move it. This combined with the fact that the stuffing-box is placed on the spindle connecting the index, and not on the crank as in other meters, the crank making many revolutions for one of the spindle (in some cases more than 20 times), it will thus be seen that a great amount of friction is obviated, and the liability of leakage at the stuffing-box immensely reduced. The index itself is encased in a gas-tight box.

430.—PORTER, G., Cullum Street, London, "*Improvements in gas-burners.*" Patent dated Feb. 4, 1875.
According to this invention an argand or other burner is provided with a valve for regulating the flow of gas to the flame. This valve is fitted to a conical seat in a chamber which is connected to the upper portion of the burner by screwing in the ordinary manner. The spindle of the valve extends down to a short piece, which is connected to the chamber in which the valve-seat is formed by a screw neck, the short piece being formed with an internal screw for attachment to a bracket or other fitting, and forming a support for the burner. The spindle may be fixed in the short piece or may rest in contact with it, without being attached to the same. In the latter case the valve is provided with a stop to prevent its coming off accidentally. By turning the valve chamber, and thereby screwing or unscrewing it upon the short piece, the valve is opened or closed, and the supply of gas to the burner can be thereby regulated with the utmost exactitude.

A very important feature of the invention is that the opening of the valve is effected by screwing the valve chamber upon the short connecting or supporting piece, and by unscrewing the chamber from its supporting piece the valve is closed and the light is diminished. If the chamber is unscrewed to its full extent it will completely close the valve and extinguish the light, and will then be stopped, whereas, on the other hand, the more the valve is opened the more firmly will the burner be supported, and therefore there will be no danger of the falling off of the burner, and consequent escape of gas. Moreover, the valve or regulator prevents the admission of more gas than is required for the burner.

A vulcanized india-rubber or other elastic packing ring or washer is placed between the valve chamber and short connecting piece, which ring will expand and contract as the valve is opened and closed, and so prevent the possibility of any escape of gas from the joint.

The screw threads and other working portions of the valve chamber and short piece are of brass, and therefore the threads will not strip, and so render the burner useless.

To form an air conductor for the improved argand burners an external shell of stamped brass or other suitable metal is constructed which shell encloses the burner proper, and forms an annular space around the same for the passage of the air, and at its lower edge is formed a turned-up flange or rim, which serves as a chimney holder. By this contrivance the rim or flange of cast metal usually employed on these burners is dispensed with, so that the cost of the burner and the obstruction to the light is reduced.

Another part of the invention relates to a provision whereby a burner may be adapted to receive either a shade or globe. For this purpose the arms whereon the globe or shade is supported are provided with set screws, and also with screw rods fitted to the same screw holes, and in the arms a recess is formed to receive the rim of the globe.

439.—WIRTH, F., Frankfort-on-the-Maine, "*Improvements in valves.*" A communication. Patent dated Feb. 5, 1875.
This valve consists of a metal cylinder, and a bent pipe which slides in it, a knob, and valve disc. The advantages of this valve, compared with the ordinary constructions, being that the pipe is gradually and slowly closed in an automatic manner, that the springs and elastic buffer discs, which must be renewed from time to time, are dispensed with, and that the simplicity of its construction.

442.—STUART, C., Halifax, "*Improvements in stop-valves and taps.*" Patent dated Feb. 5, 1875.
In this improved apparatus the box of a bevel wheel slides telescopically in a valve spindle, the bevel wheel gearing into another bevel wheel attached to a spur wheel, the latter gearing into a rack or its equivalent within the valve box. The valve is attached to the spur wheel; rotary motion being given to the spindle. The spur wheel runs up and down the rack, carrying the valve with it.

448.—POPE, R. P., King's Road, Gray's Inn, London, "*Improvements in trapping apparatus for trapping water-closets and other places to prevent the passage of effluvia.*" Patent dated Feb. 6, 1875.
According to this invention the trapping is formed of tubular coils, or a chamber to act as such, supplied with water, and caused to revolve.

477.—SCHREBLER, G., Guben, Prussia, "*Improvements in the construction of pistons for rotary engines and pumps, and in parts connected therewith.*" Patent Dated Feb. 9, 1875.
In these improvements the shaft is below the centre of the cylinder, and has a fixed guide cylinder in which the piston works; to compensate for wear and tear at the ends of the piston a packing disc is interposed between the piston and the cover, which disc can be set up.

481.—LEE, J. W., Cambridge, "*Improvements in rotary pumps.*" Provisional protection only obtained. Dated Feb. 9, 1875.
The features of novelty in these improvements consist in so arranging the interior of the pump as to do away with the necessity for cams or eccentrics.

492.—JONES, H. L., Holborn, London "*Improvements in solid and liquid disinfectants and deodorizers.*" Patent dated Feb. 9, 1875.
This invention relates to disinfecting powders and solutions, and consists in a combination or mixture of mineral sulphates and chlorides of the earthy salts, especially the combination of sulphate of zinc with chloride of sodium or calcium. The salts are powdered and mixed in the proportions of 10 per cent. of sulphate of zinc to 90 per cent. of chloride of calcium. For liquid disinfectants this same powder is dissolved in water in the proportion of one pound of the powder to each gallon of water, and it is coloured by the addition of a small quantity of aniline blue.

504.—WIKE, M. A., Abchurch Lane, London, "*Improvements in apparatus for measuring the flow of liquids.*" Provisional protection only obtained. Dated Feb. 11, 1875.
This invention consists, as regards liquid meters in which a spiral vane or screw is employed, in arranging a series of guides, vanes or curved passages for guiding the liquid on to the vane or screw at the most advantageous angle.

As regards liquid meters in which reciprocating pistons are employed, it consists in arranging a piston or plunger with a valve which remains closed, whilst the piston or plunger is being urged forward by the liquid, but opens to allow the liquid to pass through the body of the piston or plunger during its return stroke. Instead of a valve being adapted to the piston, the piston itself is, according to one modification, caused to remain in a position transverse to the direction of the motion of the liquid during its forward stroke, but to turn edgewise towards the current during its return stroke.

In another modification a series of pistons or vanes mounted on spindles radiating from a central axis rotate in a chamber by the action of the liquid, the pistons or vanes being opened out whilst traversing the acting part of the chamber and folded up or feathered whilst traversing the other or neutral part.

507.—BROADFOOT, J., Glasgow, "*Improvements in water-closets.*" Provisional protection only obtained. Dated Feb. 11, 1875.
In one modification of this invention suitable for houses or ships the bottom and outlet of the closet basin is cemented into the top of a hemispherical metal shell, which is bolted to a reverse hemispherical part formed at the top of the soil-pipe. The valve or closing detail is a segmental spherical shell inside the spherical casing, and closing up against the top opening into the casing. In the second modification, which is more especially designed for ships, the upper part of the valve-casing is the same as in the first modification, and is fitted with a similar segmental spherical valve. The mouth or top of the soil-pipe is enlarged to receive a second valve, which is, however, arranged so as to require no additional joints in the casing. An inclined valve-seat is fixed down on flanges or snugs formed for it inside the casing or enlargement, and a flap-valve is fitted to close against the under side of the valve-seat.

531.—KIDD, J., Dartmouth Street, Westminster, "*Improvements in the manufacture or production of gas for heating or other purposes and in the materials and apparatus or means employed therein.*" Patent dated Feb. 13, 1875.
This invention consists essentially in the generation of a mixture of carbonic oxide, hydrogen, and carburetted hydrogen gases from peat or wood charcoal or mixtures of the same, or from highly dried or charred peat either alone or mixed with other solid fuel, contained in a closed chamber and kept in a state of incandescence below by a jet of air and steam, the external atmosphere being entirely excluded. The mixture of gases thus generated is conveyed away by a pipe from the upper part of the closed chamber to a gasholder, wherein it is stored for future use, or it may be conveyed directly by the pipe to the place where it is to be burned.

APPLICATIONS FOR LETTERS PATENT.

13.—RAWSON, C., Westminster, and SLATER, J. W., Tamworth Terrace, London, "Improvements in deodorizing and purifying sewage." Jan. 1, 1876.
31.—JOHNS, T. H., Newport, Mon., "Improvements in apparatus for raising or forcing liquids." Jan. 4, 1876.
39.—MARRIOTT, W., Huddersfield, "An improved method of purifying coal gas." Jan. 4, 1876.
42.—WHITE, J., Plymouth, "Improvements in lamps." Jan. 4, 1876.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2539.—NICHOLAS, J., Manchester, "Improvements in apparatus for indicating the levels of water or liquid in reservoirs and other places." July 15, 1875.
2557.—GRAUHAN, F. W., Bradford, "Improvements in apparatus employed in the filtration of water, sewage, and other fluids." July 17, 1875.
2653.—HOWARD, T., Norfolk, "Improvements in the purification of gas." July 27, 1875.
3205.—SPENCER, W. H., Brooklyn, New York, "Improvements in the manufacture of illuminating gas." Sept. 13, 1875.
3303.—BELL, A. P., and THORP, T., Manchester, "A new and improved apparatus for lighting gas automatically." Sept. 21, 1875.
3739.—CLARK, A. M., Chancery Lane, London, "Improvements in the ventilation and water supply of buildings and apartments." A communication. Oct. 28, 1875.
3758.—PINKERMAN, W. J., Strand, London, "Improvements in lamps." A communication. Oct. 29, 1875.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1.—HARRISON, C. W., "Improvements in treating certain gases for lighting and heating purposes, and in combining atmospheric air therewith." Jan 1, 1873.
12.—DECASTRO, D., "Improvements in gas-meters." Jan. 1, 1873.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

3896.—BREEDEN, J., "Improvements in taps or valves for liquids, gases, and vapours." Dec. 21, 1868.
3985.—WELLS, G. M., "Improvements in wrenches." Dec. 31, 1868.

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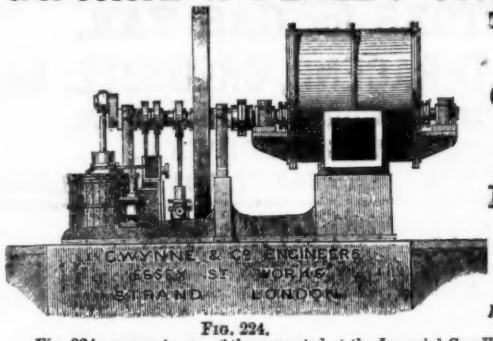

FIG. 224.

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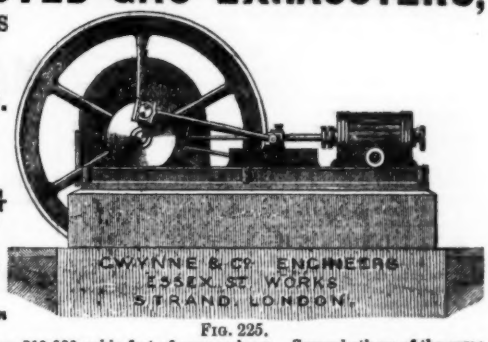

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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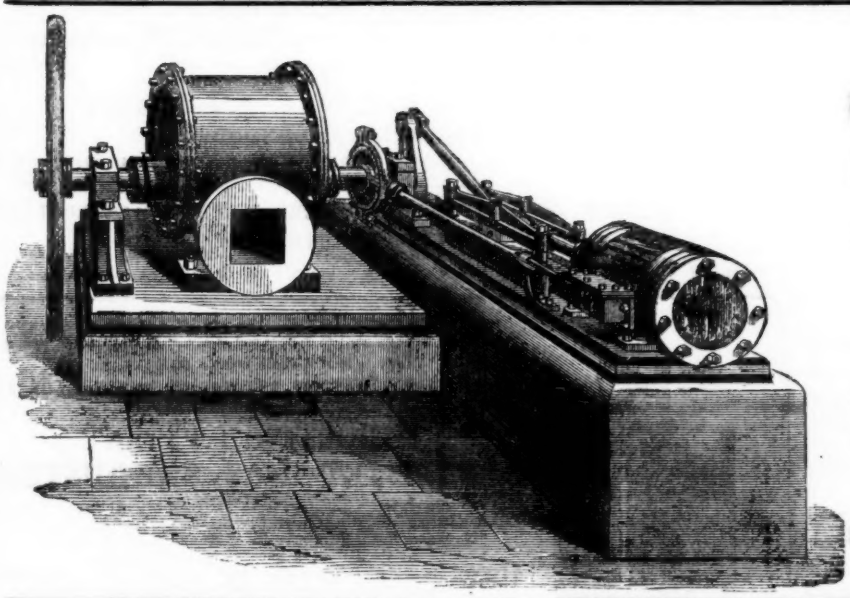

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WANTED, an honest, sober, and trust-worthy Man as WORKING MANAGER for a Gas-Work where the make is under 4 millions (assistance provided during the winter months). Must be a good stoker and thoroughly understand the whole routine of gas-making, main and service laying, meter-fixing, &c. Wages 24s. per week, with good house and garden, fuel, and gas.

Application, in writing, accompanied with testimonials as to character and abilities, to be addressed to The SECRETARY, the Gas Company, Whetstone, near LEICESTER.

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Applications, stating age, qualifications, and enclosing testimonials, to be sent in to the undersigned on or before Tuesday, the 11th day of January, 1876.

MASKELL WM. PEACE, Town-Clerk.

Town-Clerk's Office, Wigan, Dec. 23, 1875.

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The person appointed will be responsible for the maintenance in proper working condition of the whole of the engineering works, and the repairs to the building generally, and will have under him the various tradesmen necessary to do this efficiently, and whom he will have to direct, subject to the orders and control of the Medical Superintendent of the Asylum.

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Application to be by letter only, in candidate's handwriting, stating age, and enclosing copies only of testimonials (as they will not be returned) addressed to Mr. HENRY MARTIN, C.E., Hanwell, MIDDLESEX, W.

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Tenders will be received, addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Tender for Clay Retorts," not later than Wednesday, the 19th inst.

The Committee do not bind themselves to accept the lowest or any tender, nor to take the whole quantity from any one firm.

By order,
C. A. CURWOOD, Town-Clerk.

Leeds, Jan. 1, 1876.

CONTRACT FOR GAS COAL.

THE Committee of Management of the Hereford Corporation Gas-Works invite TENDERS for the supply of best GAS COAL, for six or twelve months (as may be agreed upon), from the 1st day of March next.

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Tenders to be forwarded under seal, endorsed "Tender for Gas Coal," to the undersigned, on or before Monday, the 17th inst.

By order of the Committee,
WILLIAM DAVIS, Manager.

Gas Office, Hereford, Jan. 4, 1876.

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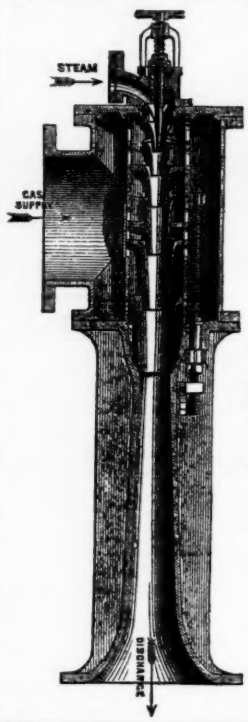

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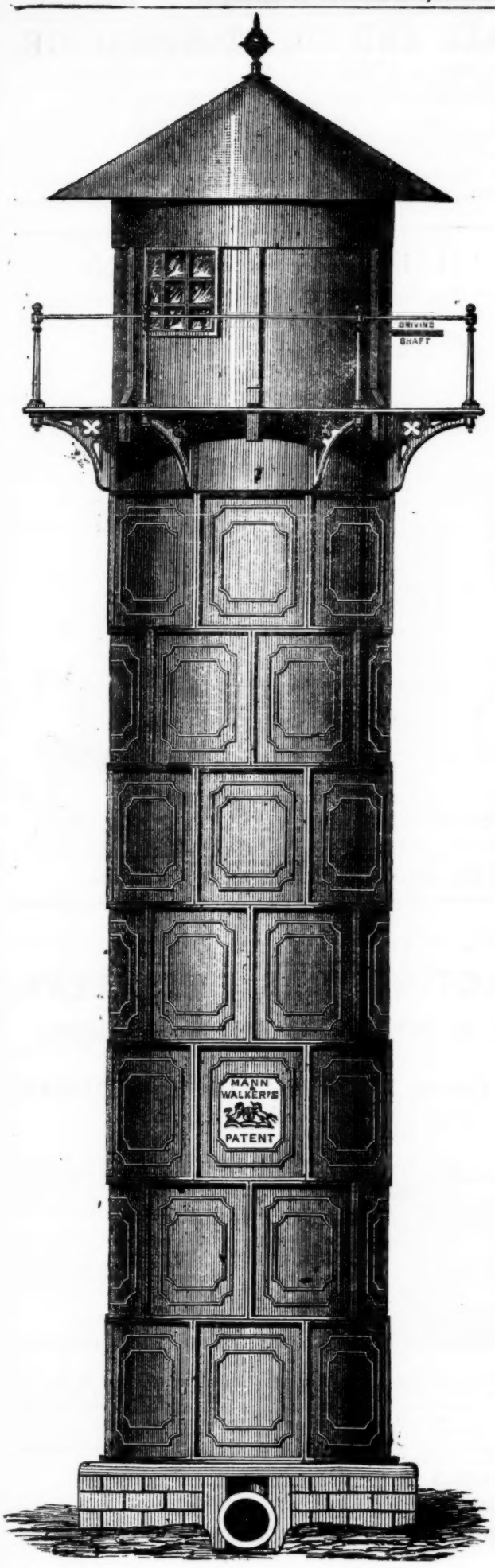

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to exercise an extraordinary effect in absorbing a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, **nearly one hundred being in use,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own motive power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (feap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK,
CONSISTING OF
Tables, Rules, and Useful Information for Gas Engineers, Managers,
And others engaged in the Manufacture and Distribution of
COAL GAS.
BY THOMAS NEWBIGGING, A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.
South Shields. W. J. WARNER.

TO GAS & WATER COMPANIES, & MUNICIPAL AUTHORITIES SUPPLYING WATER OR GAS.

CONSPIRACY AND PROTECTION OF PROPERTY ACT, 1875.

It is required, under a PENALTY OF FIVE POUNDS, that a PRINTED COPY of the 4th SECTION of the above Act shall be posted up at all Gas and Water Works in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of the section, in large type, on broad sheets, may be had of WILLIAM B. KING, 11, Bolt Court, Fleet Street, LONDON. Price, per post, 2s. per dozen, or 10s. 6d. per 100.

The Act came into operation on Sept. 1, 1875, and extends to Scotland and Ireland.

SULPHATE OF AMMONIA.

WHY sell your Liquor when it pays you better to work it up yourselves?

Consult J. JUDGE, Chemical Plumber, Burner, &c., who has put up several sets for Gas Companies with success. Saturating Tanks, &c., made to order. Success sure and nuisance got rid of.

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TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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THE BIRMINGHAM GASLIGHT AND COKE COMPANY, LIMITED.
Under which title is registered
THE BIRMINGHAM GASLIGHT AND COKE COMPANY.
Incorporated by the Birmingham Gas Act, 1855.

ALL Persons having any Claim or DEMAND upon the said Company, which has resolved to wind up its affairs voluntarily, pursuant to the Companies Act, 1862, and has appointed JAMES TERTIUS COLLINS, the Chairman, and THOMAS BULLOCK the younger, the Deputy-Chairman; together with Edward Bembridge, Edward Davenport, Frederick Everitt, Josiah Kempson, David Malins, and James Watson, the Directors, to be Liquidators of the said Company, are hereby required to SEND their full Christian and Surnames, and their Addresses, and the PARTICULARS of their Claims or Demands to the Liquidators of the said Company, at the Office of Mr. Joseph Slocombe, Public Accountant, No. 16, Bennett's Hill, Birmingham, on or before the 31st day of January, 1876, or in default thereof the Liquidators will proceed to wind up the said Company, and distribute the Assets thereof among the parties entitled thereto, having regard only to the Claims and Demands of which they the said Liquidators shall then have had notice.

JOHNSON, BARCLAY, AND JOHNSON,
36, Waterloo Street, Birmingham,
Solicitors to the Liquidators
Dated this 31st day of December, 1875.

NOTICE TO THE PUBLIC.
BRONNER'S IMPROVED SYSTEM IN GAS LIGHTING.

MESSRS. HENRY GREENE AND SON, 155, CANNON STREET, LONDON, sole consignees for Great Britain and Ireland of BRONNER'S IMPROVED SYSTEM IN GAS LIGHTING, beg to inform the public that JULIUS BRONNER, of Frankfort-on-Maine, in the Kingdom of Prussia, Manufacturer, has, of this date, 9th of November, 1875, obtained interdict before the Court of Session in Scotland, against R. M. Brechin and Company, Gas-Fitting Manufacturers, 46, Hanover Street, Edinburgh, and R. M. Brechin, the only known partner of the said firm, interdicting, prohibiting, and discharging the said R. M. Brechin and Company and R. M. Brechin from in any way advertising or offering for sale, or selling, or from in any way causing to be advertised, or offered for sale, or causing to be sold as "Brönner's Burners," any burners not manufactured by the said Julius Brönner, or from in any way endeavouring to induce the public to believe that the said R. M. Brechin and Company, or R. M. Brechin, sell or keep for sale "Brönner's Burners" manufactured by the said Julius Brönner, while such is not the case.

Further, the said Julius Brönner, on the 20th of April, 1875, in a suit in Chancery, 1874, B 365, instituted by him against a defendant who had been selling such Burners, obtained an injunction perpetually restraining the defendant, his agents, servants, and workmen, from in any way advertising or offering for sale, or selling, or from in any manner causing to be advertised or offered for sale or sold as "*Real Bronner*," or "Brönner," or "Broehner" Burners, any Burner not manufactured by or for the plaintiff, Julius Brönner, or by his agents.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
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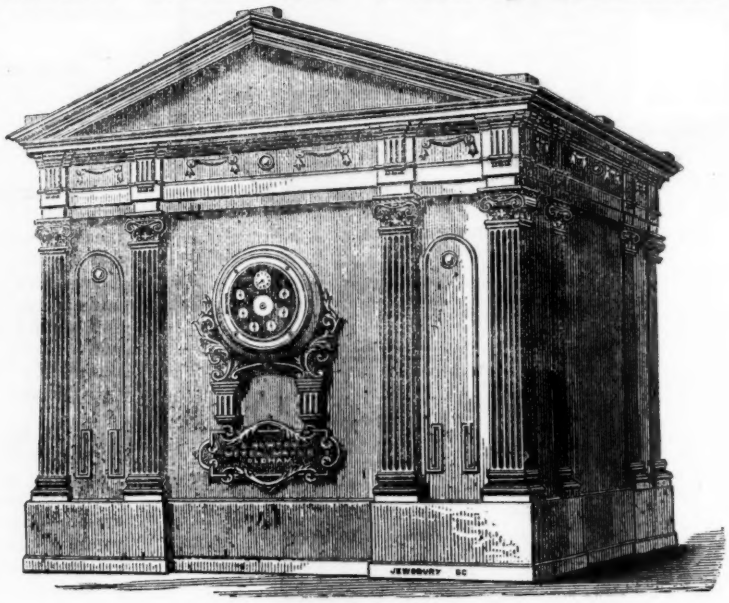

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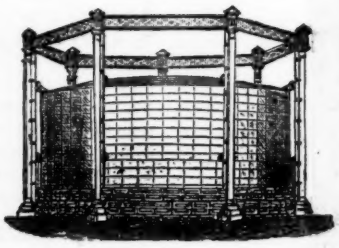

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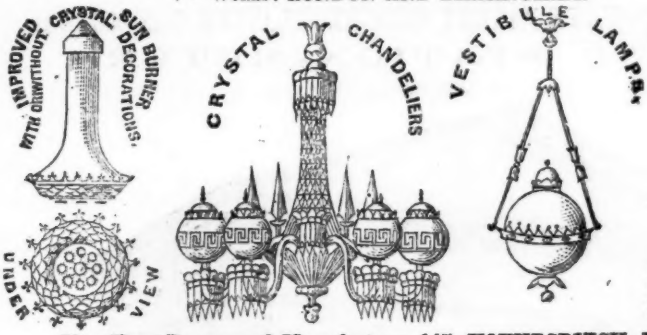

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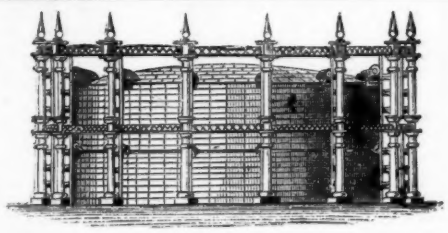

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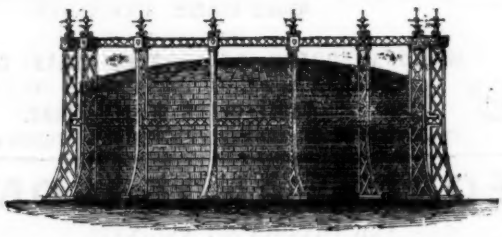

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Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

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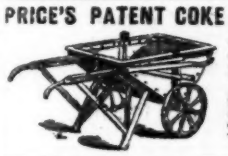

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

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BUILDING IN CONCRETE.

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By recent improvements in the Hand Block-Press and Mould of size 18 in. by 9 in. by 9 in., a Labourer can now strike off 12 Stone Shell Blocks per hour; if on piece-work, 16 to 20 Blocks perfect, without crack or flaw. These 12 blocks form 1½ superficial yard of a wall 9 in. thick, and, being as smooth and perfect as the planed mould in which they are produced, they are equal, on every side, to finely-dressed stone, or to the best ordinary house plaster. The weight of material—namely, 4 to 1, dry Concrete—employed to make each super yard of the Blocks is as follows:—

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To these figures must be added the cost of "carrying off" and "hardening"—say, 2d. per yard—and expense by waste and rent.

The Hand Press costs £55, and a Mould, of either of the sizes named, £12 10s., and appurtenances, £18. Moulds for other objects, in many cases, cost but a few shillings.

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Having shown the competitive value of Stone Shell Blocks, as displacing ordinary house wall plaster with good Concrete, from the fact of their being moulded in a Shell Block form—that is, as large hollow bricks, of perfectly true surfaces—they have a further value of 1s. per yard if used for filling up with Concrete, made in the ordinary manner, as at present compounded by contractors. The Moulding Boards, as employed by them, in framing their Concrete Walls, cost them, on the average, for taking to the work, erecting, taking down, and returning to their workshops, 1s. per yard. Walls so constructed require to be "faced" on both sides. And there is this additional value, in their being of a large hollow brick form:—where stone, boulders, or burs can be obtained to fill in with, packed as a rubble-stone wall, a smaller amount of cementing material is necessary, either Concrete or strong Mortar.

Again, a 9-in. wall of a one-stone character is equal in stability to a common brick wall 14 inches in thickness. Besides these advantages, there is that of their neat appearance, and the fact that superior buildings can be put up with a less amount of skilled labour; and on that account, together with a facility in obtaining filling up materials, they are extremely well adapted for building in country places and the colonies.

The series of practical tests with the Stone Shell Blocks are well worth the cost of a visit of inspection—a practical handling of them being very much better than any written description.

The favour of an inspection by persons purposing to erect buildings is respectfully solicited.

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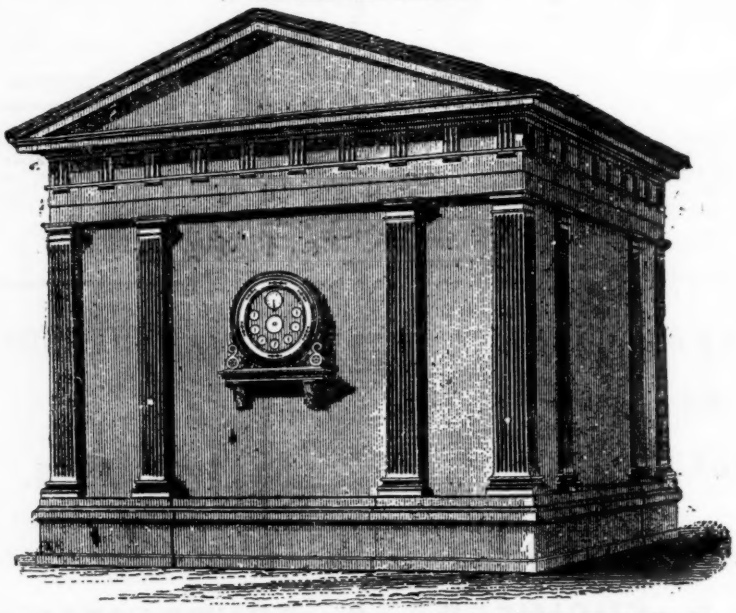
ON CAST-IRON STANDS.



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WITH PLANED JOINTS.
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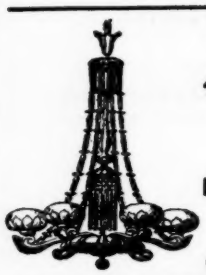

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MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
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N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artisan.*

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STEAM-ENGINES,

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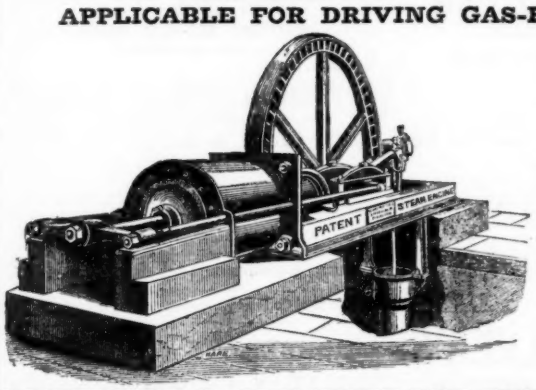

These Engines have been at work a sufficient number of years to prove their durability and efficiency.

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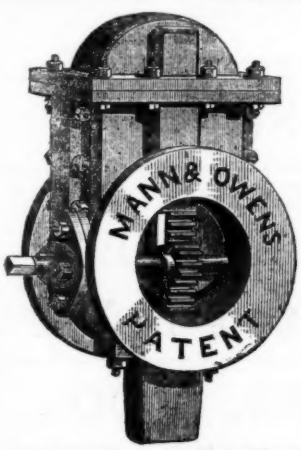

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The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

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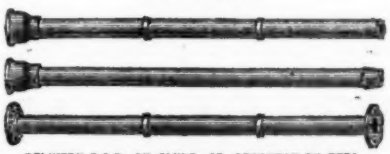

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Prices on application.

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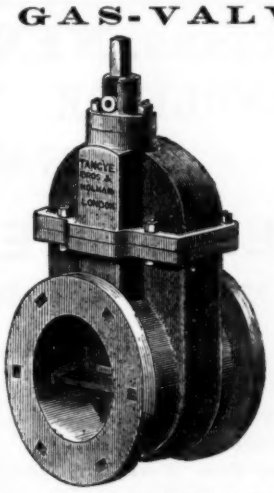

Inch.	s.	d.
3	25	0
4	36	0
5	40	0
6	54	0
7	63	0
8	80	0
9	85	0
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One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
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STRONGLY RECOMMEND A TRIAL OF THEIR
CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

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(Successors to JOHN WILLIAM O'NEILL & CO.,)

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THE DERBYSHIRE

SILKSTONE COAL COMPANY, LIMITED,

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GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

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This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

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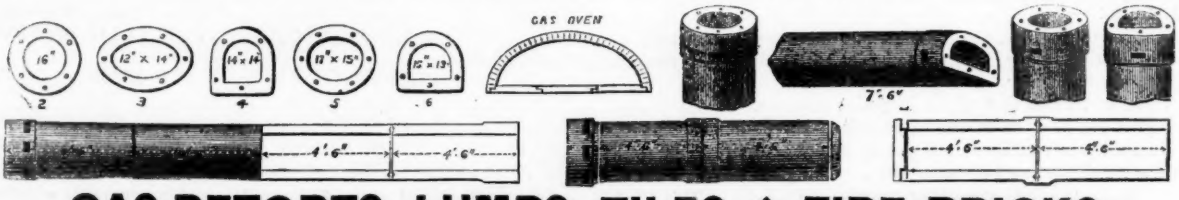

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